

## REMARKS

*For convenience, the remarks are summarized at the beginning of each response to an individual rejection of an **independent** claim, under its heading. Below follow general remarks relating to most or all of the rejections, which the examiner is respectfully asked to consider, together with the arguments given under each individual rejection.*

### OBVIOUSNESS - GENERAL ARGUMENTS

*In the response of 12<sup>th</sup> February 2007, the applicant prepared twelve pages of many detailed arguments, and was perhaps disappointed to note in the examiners action that the arguments were not considered persuasive. (The applicant agrees that then, due to his imperfect understanding of double patenting, his response to that rejection was inappropriate.) The fault may partly that of the applicant, in that the remaining arguments were not clearly stated. He feels that many of those arguments have at least some validity, and below endeavors to clarify and expand on some of them. He herewith presents new and additional arguments, which are generally underlined in this General Arguments section.*

*The examiner, in rejecting some claims, has maintained it is obvious under 35 USC 103 (a) to combine sometimes widely disparate features in separate prior art. Although this seems sometimes part of examination practice, the applicant would respectfully like to question the appropriateness of combining three, four or more references to substantially differing features, from a wide range of often seemingly non-analogous mechanical art, to cite obviousness. It occurs to the applicant that, if this is reasonable, such combinations could render virtually any mechanical invention obvious.*

*This case is parallel to application 08 / 477 704, subsequently issued as patent 7 117 827. Following a substantial amount of discussion, argument and review of all the prior art, the examiner and the applicant agreed the claims that were subsequently allowed in the parallel case.*

*It is the applicants belief that what was not obvious and was therefore allowable in application 08 / 477 704, is also not obvious and therefore allowable in the present case. It is noted that the great majority of prior art cited in this office action was also cited in earlier office actions in this case, and also in parallel application 08 / 477 704. In that parallel case, the rejections due to obviousness were successfully traversed by arguments similar to those made herein and in the previous responses (dated 25<sup>th</sup> May 2006 and 12<sup>th</sup> February 2007), these similar arguments resulting in the issue of that application as patent 7 117 827.*

*In preparing the claims in the present application 08 / 477 703 in the Supplemental Amendment and Response of 25<sup>th</sup> May 2006, almost all the dependent claims of the allowed case were copied to this case, with identical meaning and virtually identical text. In that amendment, all the previously recited prior art was listed, and it was shown that this prior art did not read on any of the independent claims.*

The applicant would again respectfully like to point out that he believes there can be no question of obviousness in the present case, for reasons set out below:

35 USC 103 (a) states in part:

" . . . .the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains.  
... "

This very long disclosure of around 46 000 words and 280 diagrams relates to the art of the construction of long-life commercial un-cooled reciprocating IC engines, **an entirely new art**. No such engines presently exist and, to the applicant's most recent knowledge (December 2007), no party is attempting to produce any kind of commercial un-cooled engine. There is so far NOBODY skilled in that art, with possible exception, in a very modest way, of the applicant. As can be seen from the comprehensive disclosure, the configurations, layout, construction and materials necessary to build viable un-cooled engines are entirely different from those used to build today's conventional cooled IC engines, **which are a separate art**.

A parent CIP 05 / 473 797 of **28<sup>th</sup> May 1974** clearly describes un-cooled commercial engines, including ceramic components, which are intended to be capable of continuous operation for indefinite periods. (See the original disclosure relating to Figs 132 through 143, of which that relating to the Figures, now renumbered as Figs. 1 through 12, is partly retained and lightly edited in the present disclosure pp 2, 3, 8 - 13.) At that time, as far as the applicant is aware, there was absolutely no talk of completely un-cooled engines. The **intent to build un-cooled engines**, and the methods whereby they may be constructed, is clearly disclosed and explained in the text of 1974, and in the further enlarged and expanded disclosure of CIP 07 / 237 761 of 29<sup>th</sup> August 1988. That disclosure was edited by selective deletion to comprise the present disclosure, which is herein amended to further include small portions of the 1974 disclosure that were earlier edited out.

In the 80's and 90's a few engineers worked on "adiabatic" or "un-cooled" engines (mostly engines of substantially reduced cooling, not no cooling). However, this work - as demonstrated by Roy Kamo and others - involved taking a standard engine and making a few material changes, without changing engine configuration in any way. For example, ceramic cylinder liners were fitted in a metal block, ceramic caps were placed on metal pistons, zirconia poppet valves replaced metal valves of identical shape. Predictably, results were not encouraging, and work on adiabatic engines was abandoned.

The work of these researchers clearly establishes a need for un-cooled engines. In the disclosures of 1974 and 1988, the applicant anticipated and met that need by showing ways of building un-cooled engines that were radically different from the work of these researchers and that overcome the problems they encountered.

The applicant believes the only way to build commercial un-cooled engines is to start with a clean sheet of paper and re-configure everything around the new parameters (no cooling, ceramic materials, utterly different manufacturing and assembly methods). The present long disclosure is the fruit of the "clean sheet of paper" approach, showing completely new ways of building **a completely new product**. For example, the CIP of 07 / 237 761 discloses features such as the integral housing with thermal insulation, the piston having passage for engine gases, the piston having combined motion and functioning as output shaft, which the applicant has never

seen in any product or publication. The applicant is convinced that this patent application describes **a new art**. In summary, when the various individual inventive steps were made, in May 1974 and August 1988, none of them were obvious to anyone of ordinary skill in the **different art** of building conventional cooled engines, let alone the new art of building completely un-cooled engines..

The applicant would like to note for the record that, in disclosing the features of the issued patent, subsequent to its publication in October 2006, to knowledgeable persons in the art of conventional cooled IC engines construction, **absolutely everything about the basic concepts of the published patent has struck these persons as entirely novel and non-obvious**. If the examiner wishes, evidence on this can be provided. The published patent has essentially the same disclosure as the present case.

MPEP 2145 states: . . . "proceeding contrary to accepted wisdom is evidence of non-obviousness". For 120 years, since their invention, commercial reciprocating IC engines have all been cooled, either by fluid in a jacket flowing in passages through engine block and / or head, or by heat-dissipating fins being mounted to cylinder and / or head. By disclosing completely un-cooled engines mounted in integral thermally insulating casings and the various novel ways they may be constructed, the inventor has proceeded contrary to all conventional wisdom. Therefore this entire disclosure and the claims relating to it are non-obvious.

The Manual of Patent Examination Procedure (MPEP), item 2143, cites three criteria to be met for determining obviousness. (The applicant interprets this to mean that for obviousness to be established, ALL the criteria must be met.) Quoting from the MPEP item 2143,

"To establish a prima facie case of obviousness, three base criteria must be met. (1) First there must be some suggestion of motivation, either in the references themselves or to the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. (2) Second there must be a reasonable expectation of success. (3) Finally, the prior art references must teach or suggest all of the claim limitations." "All words in a claim must be considered in judging the patentability of that claim against the prior art." "If an independent claim is non-obvious under 35 USC 103, then any claim depending therefrom is non-obvious." (Numerals inserted by applicant.)

In addition, MPEP 2145 sets out further reasons for non-obviousness in Section D under the heading: References Teach Away from the Invention or render prior Art Unsatisfactory for Intended Purpose". In particular: (i) "A prior art that 'teaches away' from the claimed invention is a significant factor to be considered in determining obviousness", and (ii) "The totality of the prior art must be considered, and proceeding contrary to accepted wisdom is evidence of non-obviousness". (Numerals inserted by applicant.)

The three base criteria to establish obviousness are discussed in the refutations of individual rejections under numerals (1), (2) and (3). Consideration of "teaching away" and "proceeding contrary to accepted wisdom" are discussed under numerals (i) and (ii) respectively.

MPEP, item 2141, cites the four Graham Factual Inquiries as the basis for determining obviousness; and this basis was confirmed by a recent Supreme Court decision. Quoting from the MPEP 2141, "the following tenets of patent law must be adhered to": (The applicant interprets this to mean that for obviousness to be established, ALL the tenets must be adhered to.)

- (A) Determining the scope and contents of the prior art. The claimed invention must be considered as a whole. Quoting from MPEP 2145 para IX: "A prior art reference is analogous if the reference is in the field of the applicant's endeavor or, if not, the reference is reasonably pertinent to the particular problem with which the inventor was concerned."
- (B) Ascertaining the differences between the prior art and the claims in issue. The references must be considered as a whole and must suggest the desirability and thus the obviousness of making the combination.
- (C) Resolving the level of ordinary skill in the pertinent art. The references must be viewed without the benefit of impermissible hindsight vision afforded by the claimed invention.
- (D) Evaluating evidence of secondary considerations. These include "commercial success, long felt but unsolved needs, failure of others, etc."

Concerning item (C), it is possible that some of the rejections have been inadvertently and sub-consciously made with impermissible hindsight vision by USPTO examiners. They first examined the disclosure in late 1974 or 1975, and are by now so long familiar with the concepts, that they may today appear obvious.

Concerning item (D): To a significant degree, the applicant foresaw the need to drastically reduce fuel consumption and to reduce emissions of every kind, including CO<sub>2</sub>, and it was this that motivated him to come up with a solution, the un-cooled commercial engine, as disclosed in the CIP's of 1974 and 1988. Over the last thirty years public perception has caught up with those few then concerned with excessive energy use and the increase of CO<sub>2</sub> in the atmosphere. There is now a world-wide demand for greater efficiency, including in engines, and also for reduced CO<sub>2</sub> emissions. **The present invention meets that long felt but unsolved need.**

It is estimated that today somewhere between 25 % and 45 % of the calorific content of fuel is dissipated via the cooling system and general radiation. If the engine is entirely un-cooled, temperature equilibria and therefore effective combustion temperatures would approximately double. According to Carnot theory, efficiency increases markedly with temperature spread between ambient air and combustion. An un-cooled engine scores twice: no fuel energy is thrown away, and all energy is processed more efficiently. Un-cooled engines would use half the fuel and emit half the CO<sub>2</sub> of conventional cooled engines, according to calculations by the applicant and others.

Other researchers, using conventional cooled engine designs and only substituting materials in identically shaped components, or mounting ceramic caps on metal pistons, did not succeed in

building un-cooled engines; all their designs have failed viability tests and have failed to get to commercial production. (See reference above to the work of Roy Kamo and others.)

The examiner is respectfully requested to consider the explanations of the above four paragraphs as an integral part of the applicants refutation of obviousness under items (C) and (D) of the Graham guidelines.

The four tenets of Graham required to establish obviousness are discussed in the refutations of individual rejections under the letters (A), (B), (C) and (D).

## GENERAL NOTES ON PRIOR ART MULTIPLY CITED FOR OBVIOUSNESS

Many citations were used for multiple claim rejections (Myers was cited in twelve separately argued rejections), so general comments are made once here, rather than after every claim argument. Where a citation was used for only one claim rejection (eg Iver 3 534 828), notes and comments on that prior art are given in the individual rebuttals to the rejection.

### Comments on previously listed but not cited art: Myer s 3 534 828:

The applicant respectfully disagrees with the examiner, and feels Myers is an inappropriate and a non-analogous citation, especially in view of the form and text of the independent claims before the examiner when preparing the latest office action. (The independent claims were modified in the applicant's response of February 12<sup>th</sup> 2007.) The applicants reasons are partly similar to those outlined in the case of Iver, as argued in that response to the last office action, and further below in the arguments against the examiner's rejection of claim 221 for double patenting. The examiner is respectfully requested to review these reasons, when considering the arguments in this response against rejection of the various claims in view of Myers.

Like Iver, Myers discloses an **optional add-on** to an engine system, including an improved radiator, which he describes as a heat dissipater, and an improved room or space in which an engine and a separate radiator can be accommodated. Claim 198 now recites an engine or device ". . . substantially defined by a casing having an exterior surface, said casing . . . . said (~~housing~~) casing including insulating material for the purpose of restricting heat transfer from said assembly." None of this is recited by Myers, nor does he recite any of the other features of claim 198.

The heat restriction objective of claim 198 is diametrically the opposite of the heat dissipation objective of Myers.

Myers shows insulation to the "hood", a compartment containing both the engine and the heat dissipater, solely for purpose of preventing heart dissipater water from freezing during cold weather. Myers shows no intent of restricting heat transfer from the cylinder assembly. Myers shows no interest in or anything relating to engine construction per se, in contrast to the present disclosure, which is exclusively concerned with engine construction .

As noted above, all materials have an insulating effect, but it is clear that Myers heat dissipater devices are generally best served by materials and construction having the least insulating effect.

Myers device would seem to have a low or zero prospect of success when applied to a conventional cooled engine as shown. Heat drawn from engine cooling water is transferred to air which is circulated to the intake manifold and therefore back to the engine from whence it came. This would cause the engine to overheat and fail under high load, and seemingly defeats the stated objective of engine heat dissipation. No air flow is indicated through the volume of the hood, to carry away any hot air not circulated to the intake manifold, or to prevent build up of heat from general radiation from the engine block etc, or from the heat dissipation device itself.

All engines depend on substantial quantities of ambient air flowing past them to maintain their designed temperature. Myers shows a fully "sealing" hood surrounding the engine, with no ambient air through flow indicated. This makes sense if the hood insulation is to be effective to prevent dissipater water from freezing, but air through flow would render the insulating hood lining almost meaningless. Myers lack of provision for ambient air through flow during general engine use further drastically reduces his prospect of success, to effectively zero.

It can by no stretch of the imagination be obvious for someone skilled in the art of building un-cooled engines to use any part of Myers' heat dissipating device. It is fair to say, it cannot be obvious to anyone skilled in the art of building conventional engines to combine Myers device with any other feature or engine, because of the likely problems of engine overheating and probable failure under load, due to the compromised net heat dissipation from the engine (returning heat taken from the cooling fluid back into the engine via the intake manifold), and the elimination of ambient air through flow.

Using the MPEP 2143 and 2145 guidelines on obviousness and making the MPEP 2141 Graham Inquiries on Myers, with reference to the independent claims modified earlier this year:

- (1) Myers shows no suggestion of motivation to construct an un-cooled engine having a thermally insulating casing. On the contrary, his subject matter is engine cooling and radiators.
- (2) There is NOT a reasonable expectation of success in Myers art. By recirculating heat pulled from one part of the engine back into another part via the intake charge, by eliminating air through flow, his conventional cooled engine is certain to overheat and fail under load.
- (3) Myers nowhere recites the key limitation in the present claims: including an engine with a **casing having thermal insulation**. Myers device is quite independent of the **engine, which can be entirely removed from his "hood"**, leaving hood and insulation behind (see Myers Figure 1).
- (l) Myers' cooling system "teaches away" from the present invention, which describes heat retention in un-cooled engines.

- (II) The present invention teaches contrary to Myers' and general conventional wisdom that engines need to be cooled, in that it teaches un-cooled engines.
- (A) Myers is non-analogous and non-pertinent art, since it relates to an "aftermarket" or separate heat dissipater or radiator. The present disclosure makes no mention of any desired and catered for heat dissipation or radiators. Myers' disclosure is in no way pertinent to the problem with which the inventor is here concerned: how to build integral un-cooled engines and as far as possible eliminate heat dissipation from the **combustion chamber**.
- (B) Myers has none of the features of independent claims 198 and 221, which describes a device having a **casing at least partly supporting and enclosing a cylinder assembly**, the casing having **thermal** insulation, nor of claim 277, which recites a **structure within the engine**, the structure having **thermal** insulation
- (C) There are essentially no persons having **ordinary** skill in the art of building un-cooled engines. Even if there were, they would never arrive at the aftermarket and / or separate heat dissipater or radiator of Myers to design and build an un-cooled engine with an integral thermally insulating casing.

Myers was listed as a reference in the previous office action mailed 15<sup>th</sup> August 2006, but was not cited in any of the rejection arguments therein. The applicant is disappointed that the examiner's strong feelings on Myers (eleven separate citations here) were not communicated in that office action, permitting an applicant rebuttal before this Final Office action.

**Comments on previously cited art: Gould 1 276 346:**

As noted in the applicants response of 25<sup>th</sup> May 2006, Gould recites only a pair of toroidal working chambers, and a shaft with at least one internal passage. However, it is the applicants understanding of Gould that the **shaft with the internal passages is fixed** and neither rotates or reciprocates and that, by means of the cam, all the sleeve, the cylinder ends, the **cylinder and piston rotate in unison**, with the piston additionally reciprocating within the cylinder. This is in contrast to the disclosure and claims of the present application, where in some embodiments there is an internal passage in a piston reciprocating in a cylinder, and in some embodiments the **piston rotates relative to the cylinder**. Note: None of the independent claims in the present application recite the motion of one component relative to another.

**Comments on previously cited art: Boyd 3 667 876:**

As noted in the applicants response of 25<sup>th</sup> May 2006, Boyd recites only a pair of toroidal working chambers formed by projection / depression, and a component with two longitudinal extremities, reciprocating and rotating about a co-axial and internally located rotating shaft, all mounted in a fixed cylinder. The shaft and piston rotate in unison. In the present invention, there is no distinct separate component or shaft, rotating or otherwise, within the piston component. Note: None of the independent claims in the present application recite the motion of one component relative to another.

**Comments on previously cited art: Goldsborough 1 812 870:**

As noted in the applicants response of 25<sup>th</sup> May 2006, Goldsborough recites only refractory - presumably ceramic - **lining** on the **inside** of the cylinder, and to the exterior of apiston. Neither the present disclosure nor any of the claims recite a lining to the inside of the cylinder or the outside of apiston.

**Comments on previously cited art: JP63-235648:**

JP648 shows a ceramic cap attached to a metal piston crown by a fastener, a feature nowhere disclosed or claimed in the present case, which shows no caps of any kind on pistons. The present independent claims relate to a complete functioning device or engine, distinguished by many unique features, none of which are recited by JP648. It is respectfully submitted that JP 648 cannot be cited under 103, because in the present case there is no mention of or claim for what JP 648 discloses: a separate cap mounted to a piston. The fact that a fastener is shown is incidental; attachment almost always involves some kind of fastener.

It seems that JP 648 does not add new art. Ceramic caps on pistons, some showing fasteners, were prior art previously reviewed in this case and also in allowed application 08 / 477 704, including under Kraft (4 404 935), Hauser (4 433 616), Heinz et al (4 466 399), Taylor (4 736 676), all referred to in the Supplemental Amendment of 25<sup>th</sup> May 006, which showed that the prior art did **NOT** infringe on the independent claims. In the parallel case, following review by the applicant and discussion with the examiner, the claims in that case - largely similar to those in this case - were amended to read over this prior art, and the case was subsequently allowed. It is respectfully submitted that JP 648 does not disclose features distinct from those already reviewed. In the view of the applicant, if the claims read over the prior art cited above, they therefore also read over JP 648.

- (1) **Motivation:** JP 648 seeks to limit heat flow from the combustion volume to the piston. In the present case, the motive is substantially different; to severely limit heat flow from the entire engine. The present invention, with a combustion chamber at each end of the piston, seeks to maintain the entire piston at as high and evenly distributed temperature as possible.
- (2) **Success:** In the eighties, many people tried putting ceramic caps on pistons, without success. Problems were chiefly due to the substantially different co-efficients of thermal expansion for metals and ceramics. Additionally, ceramic materials were selected for their insulating properties and had engineering strengths significantly inferior to those of the best structural engineering ceramics. As far as the applicant is aware, there is today no commercially available engine having a piston similar to that of JP 648.
- (3) **Teaching or Suggestion of all Claim Limitations:** In the opinion of the applicant, JP 648 does not teach or suggest any of the claim limitations.

**Comments on previously cited art: Arney 3 757 748:**

As noted in the applicants response of 25<sup>th</sup> May 2006, Arney recites only a pair of toroidal



working chambers, a component assembly rotating and reciprocating in a cylinder, and an internal passage, which is not part of the reciprocating assembly. Note: None of the independent claims in the present application recite the motion of one component relative to another. Arney's disclosure includes extensive structure (cooling fins) to as far as possible accelerate heat flow from the cylinder. This is direct contract to the present disclosure and claims, which teach and show features to severely limit heat flow from the cylinder.

**Comments on previously cited art: DE 3607 421 A1:**

DE 421 shows toroidal combustion chambers with the piston having a passage for charge air to the chambers. (DE 421 Figs 3, 4 and 5 describe a transmission which can be used with engine of Figs. 1 and 2.)

Earlier, in at least the parallel case 08 / 477 704, other art was found showing toroidal combustion chambers with the piston having a passage for charge air to the chambers, including Gould 1 276 346; MacKenzie 1 777 007; MacKirdy 1 801 633; Isle 1 902 781; Brown 2 918 045, 3 340 855 and 3 955 543; and Sabol 2 957 305. After the citations, following review by the applicant and discussion with the examiner, the claims in the earlier case were modified and subsequently allowed. That modified claim language has been incorporated in the present case. The supplemental Amendment of 25<sup>th</sup> May 2006 shows that this prior art is not pertinent to and does not read on any of the independent claims, and therefore not on the dependent claims either. The present case has different independent claims, with many dependent claims largely identical to those in the allowed case. In the view of the applicant, if the present claims read over the prior art cited above, they therefore also read over DE 421.

- (1) Motivation: DE 421 shows no motivation to restrict heat flow in any way.
- (3) Teaching or Suggestion of all Claim Limitations: DE 421 does not show any housing surrounding the cylinder assembly, nor any thermal insulation (Claims 198, 221). DE 421 does not show any structure outside the cylinder assembly, nor any thermal insulation (Claim 277). DE 421 shows what is a cooling jacket around the cylinder, in conflict with claim 349, which additionally specifically includes an emission control system for hot exhaust gas, not mentioned in DE 421.

**Comments on newly cited art: Butler 2 218 522**

Butler shows means to provide different and separate fluids to one combustion chamber, **using separate fuel delivery devices**, in what is clearly (from Figures 1 and 3) a conventional cooled engine complete with cooling fins.

The present invention and independent claims relate to an engine of entirely different construction and configuration, which additionally is un-cooled. It is respectfully submitted that, if the present independent claims are allowable, it is also allowable to have dependent claims relating to delivery of **multiple fluids, from a single fluid delivery assembly** (differentiated from Butler), to a single working chamber.

**Comments on newly cited art: Hoxton 1 620 100**

Hoxton discloses technologies for engine braking to slow vehicles. None of the Hoxton Figures show any engines; they only show components usable to achieve engine braking. The present disclosure relates to engines of new and original configurations, and makes no mention of engine braking technology whatever.

**Comments on previously cited art: Berger 3 503 716:**

Berger discloses an exhaust processing system outboard an engine, the system being linked to the engine via an exhaust pipe connected to an engine manifold. Part of the volume of Berger's system includes filamentary material. Note: Only one independent claim (321) in the present case relates to exhaust processing systems or filamentary material. In the present disclosure, volumes for processing exhaust gases, which optionally include filamentary material, are **located within the engine and are so defined in the claims**.

The examiner is respectfully requested to consider the above general background arguments, and also the arguments about the appropriateness of using three or more citations to reject under 103, when reviewing the applicant's arguments on the individual claim rejections presented below.

**POSSIBLE STATUTORY DOUBLE PATENTING OVER US 7 117 827**

Occasioned by applicant and examiner concerns, the applicant initiated the inspection below for statutory double patenting, based on the claims as here amended to overcome the rejections. This inspection indicated that only dependent claim 299 should preferably be amended, and that there was sufficient ambiguity in the case of claim 223 to warrant the amendment of independent claim 221.

The applicant hereby withdraws his earlier offer to file a terminal disclosure in the present case.

An inspection of all the claims revealed little double patenting of the present case over the applicant's published patent 7 117 827. In two cases where there was possible double patenting of the old claims in the present application. In one case main claim 221 is amended to overcome a rejection, to overcome potential statutory double patenting, and also possible non-statutory double patenting. In the other, claim 299 is amended to overcome possible statutory double patenting. An analysis of the inspection follows.

The independent claims in parallel application 08 / 477 704 (now issued as patent 7 117 827) all relate to the **combined** motion of components relative to one another. The piston / component always both rotates and reciprocates relative to the cylinder. None of the independent claims in the present case describes motion of components relative to one another. Therefore, the independent claims of 08 / 477 704 are on a totally distinct and separate invention to that

defined by the independent claims of the present case.

If the dependent claims of the present case are considered, only those describing the motion of components relative to one another might be considered similar to any of the claims in application 08 /477 704, later granted as 7 117 827. Here those claims are 199, 200, 222, 223, 244, 259, 279, 289, 299, 309, 323 and 385, as described in the attached schedules of all claims. In the multiple dependent claims they are 347/348: 200, 279 and 323. (Dependent claims 210, 233, 261, 290, 312, 336 and 387 read on the form or shape of a component, and do not describe motion.)

Two of the independent claims in the preceding published case recite features nowhere claimed in the present case. Independent claims 41 and 81 recite both a rotatable shaft and a mechanism (for transferring loads between piston and shaft). Therefore the only concern is whether any of the claims in present case are double patenting over any of published independent claims **1** and **117** and their dependent claims. (Here and in the immediately following paragraphs, published patent claim numbers are given in bold type.)

Claims 199, 222, 259, 287, 309 and 333 all show the cylinder assembly and contents rotatably mounted in the housing. A close inspection of the independent claims shows that cylinder assembly and contents are the present case so very differently claimed and defined from the cylinder assembly and contents in the published case, that there can be no question of double patenting. For example, in the published case, all the contents (ie piston / component) both reciprocate and rotate relative to the cylinder assembly, which is nowhere claimed in the present case.

This leaves claims 200, 223, 244, 279, 299 and 323, as well as 347/348 and 385 to be reviewed.

#### Claim 200

Claim 200 does not read on **1** or **117** or any of their dependent claims, it has the device "substantially defined by a casing having an exterior surface, said casing at least partly supporting and enclosing a cylinder assembly comprising a cylinder with two heads or ends and at least one internal circumferential depression, said assembly containing a component with at least one external circumferential projection, said projection reciprocable in said depression, said cylinder heads and said component having working surfaces partly defining at least one pair of toroidal fluid working chambers which in operation have cyclically variable capacity, . . . .", all absent from **1** and **117**.

#### Claim 223

Claim 223 does not read on **1** or any of its dependent claims, since these all have the device "including structure which defines a volume substantially surrounding the cylinder assembly, in operation said volume functioning as a passage for fluids worked by said device", all absent from 233.

Claim 223 differentiates over **117** and its dependent claims including **119** by showing ". . . said component having an internal passage for transfer of fluids to or from said working chamber, said head portion being separated from and pierced by said passage . . ." (**137** does not

include an internal passage, or piercing of the head.)

Independent claim 221 is amended to overcome a rejection. Now claim 223 is further amended to differentiate over both independent claims **1** and **117** and their dependent claims because it includes ". . . restricting heat transfer from said assembly, *said device having no purposely designed means for transferring heat from said assembly, such means including fluid circulating in a jacket adjacent to said assembly or cooling fins radiating from said assembly.*

#### Claim 244

Claim 244 does not read on **1** or any of its dependent claims, since these all have the device "including structure which defines a volume substantially surrounding the cylinder assembly, in operation said volume functioning as a passage for fluids worked by said device", all absent from 244.

Claim 244 differentiates over both **1** and **117** and their dependent claims, in particular claims **121** and **124**, because it shows ". . . *said device having no purposely designed means for transferring heat from said assembly, such means including fluid circulating in a jacket adjacent to said assembly or cooling fins radiating from said assembly*", absent from both **1** and **117**.

#### Claim 279

Claim 279 differentiates over both independent claims **1** and **117** and their dependent claims because it shows, after amendment of claim 277, "A device for the working of fluids defined by an exterior surface, a structure and a cylinder assembly having at least one internal circumferential depression all substantially located within said surface, said assembly containing a component having two cylindrical ends each with at least one opening, said component having at least one circumferential external projection reciprocable in said depression, in operation said projection and depression forming at least one pair of toroidal fluid working chambers of cyclically variable capacity, said component having at least one internal passage communicating with said openings for transfer of fluids to or from said working chambers, . . .", all absent from **1** et al and **117** et al. Additionally, **1** recites a volume surrounding the cylinder, and **117** recites insulating material, all absent 279. Neither **1** nor **117** recite a pair of toroidal working chambers.

#### Claim 299

Claim 299 differentiates over both independent claims **1** and **117** and their dependent claims because it shows "a cylinder assembly comprising a cylinder with at least one internal circumferential depression, said assembly containing a component with at least one external circumferential projection, said external circumferential projection reciprocating in said circumferential depression and both having working surfaces defining at least one pair of toroidal fluid working chambers which in operation have cyclically variable capacity, . . .", all absent from **1** et al and **117** et al. Additionally, **1** recites a volume surrounding the cylinder, and **117** recites insulating material, all absent 299.

Claim 323

Claim 323 differentiates over both independent claims 1 and 117 and their dependent claims because it shows “. . . said component having at least one external circumferential projection, said cylinder assembly having at least one internal circumferential depression in which said projection is positioned to reciprocate, in operation said projection and depression defining a pair of toroidal fluid working chambers of cyclically variable capacity . . . . said volume containing said filamentary material and at least partly surrounding portion of said cylinder assembly”, all absent from 1 et al and 117 et al.

Claim 385

Claim 323 differentiates over both independent claims 1 and 117 and their dependent claims because it shows “. . . an emission control system for hot exhaust gas emitted from said engine when operative, said engine having no purposely designed means for transferring heat from said assembly nor any circulating liquid lubrication between said component and said cylinder”, all absent from 1 et al and 117 et al.

Multiple Dependent Claims 347/348: 200, 279, and 323

These four claims differentiate over both independent claims 1 and 117 and their dependent claims for the reasons given above under claims 200, 279 and 323. Claim 347 shows “. . . an emission control system for hot exhaust gas emitted from said engine when operative, said engine having no purposely designed means for transferring heat from said combustion chamber, such means including fluid circulating in a jacket adjacent to said assembly or cooling fins radiating from said assembly.”, all absent from 1 et al and 117 et al. Additionally, claim 348 recites a turbine stage.

It is respectfully submitted that, with the amendment to the claims made in this response, the invention of the above claims are distinct and different from the invention of patent 7 117 827, and that the matter of statutory double patenting does not arise and is moot.

## SPECIFIC ARGUMENTS ON REJECTIONS

### 35 USC #112

Claims 349 - 357, 364 - 366, 375 and 376 are rejected as failing to comply with the enabling requirement.

Claim 349 is modified to remove the citation of performance and to introduce new limitations:

349 (Currently Amended) A device for processing fluids ~~(having)~~ said device substantially defined by a casing having an exterior surface and thermal insulation, said casing at least partly supporting and enclosing at least one cylinder assembly including a cylinder and at least one (partly closed end functioning as a) cylinder head, said assembly containing a component reciprocable therein (in said cylinder) to define at least one working chamber of cyclically varying capacity located between said component said cylinder and said cylinder head, wherein said device is an un-cooled reciprocating internal combustion engine and said working chamber functions as a combustion chamber, said engine having a charge gas supply system, a fuel delivery apparatus and an emission control system for hot exhaust gas emitted from said engine when operative, said engine (being free of purposely designed mechanism or construction for transferring heat from said cylinder or said cylinder head and being capable of continuous operation for an indefinite period) having no purposely designed means for transferring heat from said assembly nor any circulating liquid lubrication between said component and said cylinder.

Remarks on some of the examiner's arguments follow. The claims listed above are based on independent claim 349 and its dependent claims, here remarks on the rejection are limited to independent claim 349.

The applicant has noted the wording of the first paragraph of 35 USC 112. Everything in claim 349 as it stood is described in the disclosure, including in those portions dating from 1974. (For further reference to the 1974 text, see the earlier general comments on obviousness.) The reference to "indefinite" has perhaps been interpreted by the examiner as meaning "infinite". It is known that when a conventional cooled engine is run without cooling, it will over-heat and fail within a period that is finite and its designer can calculate. The word indefinite was used to convey the meaning that failure cannot be predicted through lack of cooling. In this amendment however, all reference to performance is removed.

The examiner maintains that there is "... nothing in the disclosure that would enable one of ordinary skill in the art to build an un-cooled engine". The applicant would respectfully like to point out that there is much detailed description of how un-cooled engines can be built in the disclosure of 45 000 words and over 280 diagrams, in particular in those portions relating to Figs 1 to 32, 42 to 81, 98 to 140 and 252 to 271.

The applicant does not understand the basis for the examiner's assertion that "at best the any engine built according to the instant disclosure would operate no more than a few hours before cracking, spalling, seizing and breaking." For many years the applicant has been working with a team of internationally recognized experts in various fields, including in materials science, crack propagation, fuel delivery, emissions control, combustion, kinematics, dynamics, tribology, labyrinth sealing etc. They are familiar with the particulars of the invention, and all believe, with the applicant, that there is absolutely no reason why the engines can not be built as commercial products, with life and operating cycles at least equivalent to conventional engines. Evidence on these views can be provided.

Considering everything in the claim was in the disclosure, it seems to the applicant that rejection under 35 USC 112 may possibly have been unwarranted. Nevertheless claim 349 has been amended to remove the clause containing "indefinite" and introduce new limiting features, claimed earlier and already examined.

## NON-STATUTORY DOUBLE PATENTING

Claim 221 is rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1 + 22 of patent 7 117 827 in view of Iver et al (3 534 828).

Claim 221 is modified to overcome non-statutory double patenting, as follows:

221 (Currently Amended) A device for the working of fluids, said device having an operating cycle and being substantially defined by a casing having an exterior surface, said casing (~~comprising an integral housing~~) at least partly supporting and (~~substantially~~) enclosing a cylinder assembly, said assembly having a cylinder portion and at least one cylinder head portion and a component reciprocally movable within said assembly, said head portion and said component partly defining a cyclically variable working chamber therebetween, said component having an internal passage for transfer of fluids to or from said working chamber, said (chamber) head portion being separated from and pierced by said passage during at least part of said cycle, said casing (housing) including insulating material for the purpose of restricting heat transfer from said assembly, said device having no purposely designed means for transferring heat from said assembly, such means including fluid circulating in a jacket adjacent to said assembly or cooling fins radiating from said assembly.

The applicant is not sure of the validity of citing prior art by others to reject under non-statutory obviousness. He has so far been unable to find guidance in MPEP 804 to an obviousness rejection over prior art by others. If it were valid, the applicant avers that obviousness cannot be established in view of Ivers, for reasons given below.

The applicant respectfully disagrees with the examiner, and feels Iver is an inappropriate and non-analogous citation, especially in view of the form and text of the independent claims before the examiner when preparing the latest office action. In the office action mailed 15<sup>th</sup> August 2006, Iver was cited ten times. In the response to that action dated 12<sup>th</sup> February, the applicant submitted multiple arguments to refute the validity of citing Iver for obviousness, and **additionally substantially modified the independent claim to further distinguish over Iver**. His arguments for the inappropriateness of citing Iver are clarified and amplified here.

Earlier, in both this case and in parallel case 08 / 477 704, the examiner had cited Nallinger (3 112 810) on many occasions and, following discussion, claims were amended to read over Nallinger. They were allowed and now do so. In the view of the applicant, if the claims read over Nallinger, they therefore also read over Iver. Nallinger, like Iver, discloses an enclosure for acoustic attenuation purpose fitted about an already manufactured and independently functioning product, such as an engine. In the claims under review, the casing is an integral part of a device of an engine clearly described by many distinguishing features. In contrast, Iver's and Nallinger's general reference is just to an engine or machine, **which is serviced by their separate, optionally after-market, acoustic attenuation product**.

Iver's (and Nallinger's) disclosure is of a wrapping or cladding for sound attenuation purpose is very different from the integral **thermally** insulating casing, as casing is defined by the dictionary,

such as is disclosed in Figs. 21, 23 - 25, 129 - 132, 136 - 140. Their disclosures show zero motivation to drastically restrict heat flow from a cylinder or cylinder head. In fact, their disclosures show no intent to construct an engine of any kind, let alone an un-cooled one, nor do they show any reference to or interest in engine construction.

Using the MPEP 2143 and 2145 guidelines on obviousness and making the MPEP 2141 Graham Inquiries on Ivers, with reference to the independent claims as modified earlier this year:

- (1) Iver shows no suggestion of motivation to construct an un-cooled engine having an thermally insulating **integral** casing. **Iver's sole motivation is sound attenuation.** Iver recites only "cladding for sound attenuation purpose around machines, such as engines, gearboxes or compressors". He is only interested in providing sound attenuation for already built machines, fully operational without Iver. Iver sees his product as an optional accessory to a machine, to be used only to reduce noise. The applicant was not able to find a single reference to thermal issues in Iver's disclosure.
- (2) Iver's device has a low or zero probability of success for the purpose for which it was intended, as applied to combustion engines. The limits of proper functionality for all machines, including engines, are designed for the maximum load and highest ambient temperature to be encountered in their application. In engines, the loss of heat by radiation from the engine block, oil sump cover, and cylinder head is always calculated in to determine proper functionality under the most highly stressed conditions. This heat loss or dissipation is effected by ambient air flow past or over the engine. The loss of ambient air circulation that the fitment of Iver's device to an already designed and manufactured **conventional** cooled engine would entail, would effectively guarantee engine failure during operation under the maximum stress conditions the un-clad engine was originally designed for. Although the temperatures of conventional engines are less than those of un-cooled engines, they can still be substantial. The "plastic foam" and resin impregnated glass fibre matting materials advocated by Iver generally (excepting the glass) have low melting temperatures and many foams and resins are both flammable and have low flash point temperatures. Under stressed conditions, eg the maximum load designed for, the exterior surface of an engine block not exposed to ambient air through-flow could reach well over 200 degrees Centigrade, enough to melt or otherwise degrade Iver's material, or to initiate a fire, or to cause venting of dangerous gases from Iver's plastic foam. The lack of ambient air flow is also likely to cause any cooling fluid to boil. Although it seems Ivers invention is not suited to be applied to conventional combustion engines (as he claims), it could constitute a successful aftermarket add-on to other machines, such as transmissions, as he avers.
- (3) Claim 221 recites a key limitation: **an casing at least partly supporting and substantially enclosing a cylinder assembly**, the casing including **thermal insulation**. Iver nowhere recites an engine with an integral casing having thermal insulation, or any particulars of an engine. Iver's device is quite independent of the **engine, and his device can be entirely removed from the engine without affecting it in any way**. In the office action, the examiner refers to "the housing of Iver et al". The applicant was not able to find any reference to a "housing" in Iver; instead Iver refers to a "cladding". A cladding is substantially different from a housing. The Iver Figures clearly show a cladding, as distinct from a housing. The Oxford American Dictionary of Current English (publication 1999) makes this distinction:



"Cladding: a covering or coating on a structure or material, etc."

"Housing: 3 a rigid casing, esp. for moving or sensitive parts of a machine." To further distinguish over one of the examiner's citations of obviousness, in this response 'housing' is changed to "casing". According to the dictionary, the two words are effectively synonyms,

- (I) Iver's sound attenuation device "teaches away" from the present invention, which describes heat retention integrally designed into un-cooled engines.
- (II) The present invention teaches contrary to Iver's and general conventional wisdom that engines need to be cooled, in that it teaches un-cooled engines.
- (A) Iver is non-analogous and non-pertinent art, since it relates to an "aftermarket" or separate sound attenuation device. Iver's disclosure is in no way pertinent to the problem with which the inventor is here concerned: how to build un-cooled engines and as far as possible eliminate heat dissipation from the combustion chamber.

As the examiner has rightly pointed out, every substance to some degree or other can effect thermal insulation. In the view of the applicant, it is perhaps unreasonable to cite a new feature (cladding or wrapping is not disclosed in the present case) from an entirely separate art (sound attenuation as opposed to un-cooled engine construction) under 103, just because all substances share the characteristic of effecting some degree of thermal insulation. In the office action, the examiner alleges that "it would have been obvious wrap the engine of 08/ 477 703 with the **housing** (the applicant's emphasis: Iver discloses a cladding, not a housing or casing) of Iver et al which includes foam for noise reduction. The foam would inherently provide thermal insulation." For reasons stated above, it is not at all obvious to apply Iver's foam, which is likely to melt or ignite. This is in addition to the fact that one cannot design an engine for certain requirements, in the hope that someone might possibly at some stage apply an entirely separate and aftermarket item.

- (B) Iver has none of the features of independent claim 221, which describes a device having **a casing at least partly supporting and substantially enclosing a cylinder assembly** having **thermal** insulation.
- (C) There are essentially no persons having **ordinary** skill in the art of building un-cooled engines. Even if there were, it is respectfully submitted that it would **not** be obvious to some skilled in the NEW art of building un-cooled engines, to relay on a separate "after-market" sound-attenuation cladding, made according to Iver of polyrethene foam and resin-impregnated glass fibre matting, to provide the desired thermal insulation to a separate pre-manufactured engine having internal temperatures of the order of 1000 degrees Centigrade or above. Both the foam and matting have far lower melting temperatures, and both are likely to be flammable. See comment under (2) above.

Notwithstanding the arguments above, independent claim 221 has been amended to **further distinguish** over Iver,

It is respectfully submitted that the rejection is hereby traversed and independent claim 221 and its dependent claims are allowable.

### 35 USC 103 - OBVIOUSNESS

Claims 198, 199, 202, 203, 206 - 208, 216, 217 and 219 are rejected as being unpatentable over Gould in view of Myers.

The applicant argues below that claim 198 as it stood before the examiner could not be rejected for obviousness. Nevertheless, he has amended some of its wording to further distinguish over Myers, as follows:

198 (Currently Amended) A device for the working of fluids, said device substantially defined by a casing having an exterior surface, said casing (~~having an integral housing~~) at least partly supporting and (~~substantially~~) enclosing a cylinder assembly comprising a cylinder with two heads or ends and at least one internal circumferential depression, said assembly containing a component with at least one external circumferential projection, said (~~external circumferential~~) projection reciprocable in said (~~internal circumferential~~) depression (~~and both cylinder and~~) said cylinder heads and said component having working surfaces partly defining at least one pair of toroidal fluid working chambers which in operation have cyclically variable capacity, said casing (~~housing~~) including insulating material for the purpose of restricting heat transfer from said assembly.

Please see the general comments on Myers and Gould above. Gould discloses an entirely different engine from that of claim 198, the only shared feature being toroidal working chambers.

Independent claim 198 was amended in response to the last office action of 15<sup>th</sup> August 2006, to more clearly distinguish over Iver, and therefore it will also more clearly distinguish over the somewhat similar Myers.

The applicant maintains that the combination of Gould and Myers is **not** obvious. Using the MPEP 2143 and 2145 guidelines on obviousness and making the MPEP 2141 Graham Inquiries on Gould plus Myers, with reference to the independent claims as modified earlier this year:

- (1) There is no suggestion of motivation by Gould to combine with the separate heat dissipater and hood compartment with insulated lining of Myers, nor to include the thermally insulating casing of claim 198. There is no suggestion of motivation by Myers to build the engine of Gould, nor the engine of claim 198, nor indeed any engine.
- (2) There is no reasonable expectation of success in combining Myers with Gould or with claim 198, since Myers art, with its recycling of coolant water heat back to the air intake and elimination of ambient air-flow, is essentially unworkable in practice.
- (3) The key limitations s in claim 198 are not recited by Gould and / or Myers in any way.

*They are: "... device substantially defined by a casing having an exterior surface, said casing at least partly supporting and enclosing a cylinder assembly . . . . said casing including insulating material for the purpose of restricting heat transfer from said assembly."*

*Therefore Gould plus Myers, whether obvious or not, does not read on claim 198 and it should be allowed. If claim 198 is allowable, so are its dependent claims.*

- (i) *Gould "teaches away" from the present disclosure in that the moving parts of his engine relate to one another in a quite different way and are of different geometric layout. Myers "teaches away" to only disclose heat dissipation / cooling means for an undescribed / unspecified engine.*
- (ii) *The disclosure and claims proceed contrary to the conventional wisdom of providing heat dissipation and cooling means for engines.*
- (A) *Myers is non-analogous and non-pertinent art, since it relates to an optional "aftermarket" or outboard heat dissipater for a separate engine. Independent claim 198 relates to un-cooled engines in integral thermally insulating casings, and reads on heat retention, not heat dissipation. Gould is an entirely different engine, wherein a cylinder and piston rotate in unison around a fixed shaft within the piston. Claim 198 does not describes motion of one component relative to another. Neither Myers' nor Gold's disclosures are in any way pertinent to the problem with which the inventor is here concerned: how to build integral un-cooled engines and as far as possible eliminate heat dissipation from the combustion chamber.*
- (B) *Myers has none of the features of independent claim 198. The insulation is to a hood enclosure, entirely separate from an engine, and is for purpose of preventing the water in the heat dissipater from freezing. Unlike Myers, claim 198 describes a casing integral portion of an engine, which has no heat dissipater, and where thermal insulation is included in the casing to **restrict** heat dissipation. Gould shows only toroidal working chambers. It does not show claim 198 features "a casing at least partly supporting and substantially enclosing a cylinder assembly", nor the "casing including insulating material for the purpose of restricting heat transfer from said assembly". Neither Gould nor Myers suggest any desirability of combining with the other.*
- (C) *There are essentially no persons having ordinary skill in the art of building un-cooled engines. Even if there were, they would never arrive at the optional aftermarket and outboard heat dissipater and hood enclosure of Myers in combination with the entirely different engine of Gould to design and build the un-cooled engine of claim 198, having an integral thermally insulating casing.*
- (D) *As noted above, the present unique and distinctive invention meets long felt but unsolved needs.*

*Strong (but not conclusive) evidence against the combination of Gould (1918) and Myers (1944) being obvious, is the age of the disclosures. If it were obvious, there would have been intervening art - in the crowded field of engines and their systems - prior to that alleged in he present application.*

*Dependent claims 216, 217 relate to fasteners of tubular form and read on the disclosure of*

Figure 140, where a single tube is the sole fastener for the cylinder assembly and another tube the sole fastener for the piston assembly. Figures 136 and 137 show a hollow bolt-type fastener, optionally of metal, with the interior volume usable to cool the faster. The prime objectives of cylindrical fasteners were not to save weight.

Regarding claim 206, the point of imperfections during machining was raised by the examiner during his meeting with the applicant, who subsequently in the response of 12<sup>th</sup> February 2007 amended claim 206 to recite a "small deliberately manufactured depression". The applicant respectfully avers that "deliberately" in combination with "manufactured" overcomes the examiner's objections. In patent 7 117 827, the examiner allowed claim 26, which recites a "manufactured depression", without mention of "deliberately". If claim 198 is allowable, so is dependent claim 206.

Concerning claim 207, Gould shows a passage for exhaust gas volume within the engine, but not surrounding the cylinder, and no exhaust pipe outside the engine. Myers does not show any exhaust volume within the engine, only a conventional exhaust pipe. It is not clear to the applicant how placing Gould's engine, with its exhaust pipe within its cylinder, anywhere in Myers' "hood" space could read on claim 207. Claim 207 is herewith amended and modified to further distinguish over Gould and Myers, as are claims 230, 256, 285 and 307. The applicant is not aware of any past or present production vehicles with thermal insulation to exhaust pipes (as distinct from protective shields in local locations to prevent accidental burning to someone making an engine inspection or adjustment). The applicant's lack of knowledge does not mean such vehicles did / do not exist.

Notwithstanding the arguments above, relating to claims before the examiner when he made the rejection, independent claim 198 has been amended to **further distinguish** over Gould plus Myers,

It is respectfully submitted that the rejection is hereby traversed and independent claim 198 is allowable, and therefore its dependent claims are allowable too.

Claims 198, 200, 209, 210, 277 - 281, 284, 286, 288, 290, 293 and 296 are rejected as unpatentable over Boyd in view of Myers.

The applicant argues below that claims 198 and 277 as they stood before the examiner could not be rejected for obviousness. Nevertheless, he has amended some of the wording to claim 198, as given above, and to claim 277 as given below, to further distinguish over Myers:

277 (Currently Amended) A device for the working of fluids defined by an exterior surface, said device including a (comprising an integral) structure (-) and a cylinder assembly having at least one internal circumferential depression all substantially located within said surface, (and mounted in and at least partly surrounded by said structure and containing a component reciprocable in said assembly,) said assembly containing a component having two cylindrical ends each with at least one opening (and), said component having at least one circumferential external projection reciprocable in said (circumferential) depression (in said assembly to form) , in operation said projection and depression forming at least one pair of

*toroidal fluid working chambers of cyclically variable capacity, said component having at least one internal passage communicating with said openings for transfer of fluids to or from said working chambers, said structure being in proximity to and at least partially surrounding portion of said cylinder assembly and including insulating material to restrict heat transfer from said assembly (~~in operation said openings permitting transfer of fluid between said passage and said working chambers~~) .*

Please see the general comments on Myers and Boyd above. Boyd discloses an entirely different engine from that of claim 198, the only shared feature being toroidal working chambers.

Independent claims 198 and 277 were amended in response to the last office action of 15<sup>th</sup> August 2006, to more clearly distinguish over Iver, and therefore they will also more clearly distinguish over the somewhat similar Myers.

Boyd discloses only toroidal working chambers formed by a projection and a depression, and a component or piston with two longitudinal extremities. The piston rotates in unison with an internal shaft, but reciprocates relative to it. The shaft rotates within a fixed cylinder. Myers shows a heat dissipater or radiator in an engine compartment or hood, which has thermal insulation to prevent water freezing in the engine compartment. Both compartment and radiator are entirely separate to the engine.

It would appear that Myers insulation is not to reduce noise, as maintained in the rejection (page 4, line 22), but to provide some thermal insulation to prevent water in the heat dissipater from freezing. The applicant disagrees that "housing", in the context of claim 198 as it then stood, could include a building or separate structure. The Oxford American Dictionary defines "housing" inter alia as; 3) "a rigid casing, esp. for moving or sensitive parts of a machine". Please note that, during the applicant's last response, claim 198 was amended to read ". . . . having an integral housing at least partly supporting and substantially enclosing a cylinder assembly . . . ." and it seems to the applicant that this new wording clearly distinguishes over the hood insulation of Myers. Claim 277 was similarly amended at that time. In this response, 'housing' in the claims is changed to "casing", to further distinguish over Myers.

The applicant maintains that the combination of Boyd and Myers is **not** obvious. Using the MPEP 2143 and 2145 guidelines on obviousness and making the MPEP 2141 Graham Inquiries on Boyd plus Myers, with reference to the independent claims as modified earlier this year:

- (1) There is no suggestion of motivation by Boyd to combine with the separate heat dissipater and hood compartment with insulated lining of Myers, nor to include the thermally insulating casing of claim 198. There is no suggestion of motivation by Myers to build the engine of Boyd, nor the engine of claim 198, nor indeed any engine.
- (2) There is no reasonable expectation of success in combining Myers with Boyd or with claim 198, since Myers art, with its recycling of coolant water heat back to the air intake and elimination of ambient air flow, is unworkable in practice.
- (3) The key limitations in claims 198 and 277 do not relate to Boyd and / or Myers in any way. They are (198) ". . . device substantially defined by a casing having an exterior surface, said casing at least partly supporting and enclosing a cylinder assembly . . . . said casing including

*insulating material for the purpose of restricting heat transfer from said assembly.” and (claim 277) “A device for the working of fluids defined by an exterior surface, a structure and a cylinder assembly . . . said structure being in proximity to and at least partially surrounding portion of said cylinder assembly and including insulating material to restrict heat transfer from said assembly”. Therefore Boyd plus Myers, whether obvious or not, does not read on either claim 198 or claim 277, and they should be allowed. If claims 198 and 277 are allowable, so are their dependent claims.*

- (I) *Boyd "teaches away" from the present disclosure in that the moving parts of his engine relate to one another in a quite different way and are of different geometric layout. Note that Boyd's "piston" is a cylinder with an internal projection. Myers "teaches away" to only disclose separate heat dissipation / cooling means for an undescribed / unspecified engine.*
- (II) *The disclosure and claims proceed contrary to the conventional wisdom of providing heat dissipation or cooling means for engines, in that they teach un-cooled engines.*
- (A) *Myers is non-analogous and non-pertinent art, since it relates to an optional "aftermarket" or outboard heat dissipater for a separate engine. Independent claims 198 and 277 relate to un-cooled engines having integral thermally insulating housings or structures, and read on heat retention, not heat dissipation. Boyd is an entirely different engine, wherein a piston reciprocates and rotates and is mounted around a rotatable shaft within the piston. In the present disclosure there is no major component within the piston that moves relative to it. Neither claim 198 nor 277 describes motion of one component relative to another. Neither Myers' nor Boyd's disclosures are in any way pertinent to the problem with which the inventor is here concerned: how to build integral un-cooled engines and as far as possible eliminate heat dissipation from the combustion chamber.*
- (B) *Myers has none of the features of independent claim 198. The insulation is to a hood enclosure, entirely separate from an engine, and is for purpose of preventing the water in the heat dissipater from freezing. Unlike Myers, claims 198 and 277 describes a housing or a structure which is an integral portion of an engine, which has no heat dissipater, and where thermal insulation is included in the housing or structure to **restrict** heat dissipation. Boyd shows only toroidal working chambers and a reciprocating component with two cylindrical ends. It does not show claim 198 feature "an integral casing at least partly supporting and substantially enclosing a cylinder assembly", nor the "casing including material for the purpose of restricting heat transfer from said assembly". It does not show claim 277 feature a "structure at least partly surrounding said cylinder assembly and including insulating material to restrict heat transfer . . .". Neither Boyd nor Myers suggest any desirability of combining with the other.*
- (C) *There are essentially no persons having **ordinary** skill in the art of building un-cooled engines. Even if there were, they would never arrive at the optional aftermarket and outboard heat dissipater and hood enclosure of Myers in combination with the entirely different engine of Boyd to design and build the un-cooled engines of claims 198 and 277, having an integral thermally insulating casing or structure.*
- (D) *As noted above, the present unique and distinctive invention meets long felt but unsolved needs.*

Regarding claim 220, during the meeting with the examiner, he pointed out that "disengagable" might be understood to mean disassembled. In deference to the examiner, claim 220 was modified during the last response to read ". . . during operation of said device", and this hopefully excludes disassembly.

The dictionary gives four different meanings to "housing", one of which is: "Housing: 3 a rigid casing, esp. for moving or sensitive parts of a machine." Although it seems obvious that this is meaning used here, and can in no way be understood to mean a building. Throughout the claims, 'housing' is amended to "casing".

It is agreed that Boyd shows a cylinder assembly of multiple parts (60 through 64). Claim 281 is dependent on claim 277, and is allowable if that independent claim is allowable.

Notwithstanding the arguments above, largely relating to claims before the examiner when he made the rejection, independent claims 198 and 277 have been amended to **further distinguish** over Boyd plus Myers,

It is respectfully submitted that the rejection is hereby traversed and independent claims 198 and 277 are allowable, and therefore their dependent claims are allowable too.

Claims 280 and 292 are rejected as unpatentable over Boyd in view of Myers and further in view of Goldsborough. This rejection, the two prior rejections, and many of those that follow, are virtually identical to those made in the office action mailed 15<sup>th</sup> August 2006, except that Myers has been substituted for Iver. It is respectfully submitted that the remarks to traverse Iver made in the response to that action also apply to the present citation of Myers.

Please see arguments against rejection of the claims immediately above, and also the general comments on Goldsborough, further above. Goldsborough shows only a refractory / ceramic lining on the inside of the cylinder. Ceramics are a well known materials group. Claims 280 and 292 are dependent claims, calling for the **particular components of independent claim 277** to be of ceramic material. If independent claim 277 is allowable, so are dependent claims 280 and 292.

None of the citations discloses the key limitations of claim 277. They are: ". . . *an exterior surface, a structure and a cylinder assembly having at least one internal circumferential depression all substantially located within said surface . . . . said component having at least one circumferential external projection reciprocable in said depression, in operation said projection and depression forming at least one pair of toroidal fluid working chambers of cyclically variable capacity . . . . said structure being in proximity to and at least partially surrounding portion of said cylinder assembly and including insulating material to restrict heat transfer from said assembly*". Therefore Boyd plus Myers plus Goldsborough, whether obvious or not, does not read on claim 277, and it should be allowed. If claim 277 is allowable, so are its dependent claims.

The applicant maintains that the combination of Boyd and Myers and Goldsborough is **not** obvious, for reasons largely identical to those given under the previous rejection. Goldsborough discloses none of the features of independent claim 277. This application does not disclose linings to the insides of cylinders. Therefore, the arguments under the MPEP 2143 and 2145

guidelines and the Graham Inquiries on Boyd plus Myers in relation to independent claims 198 and 277 and their dependent claims, which were made above, establish the non-obviousness of Boyd plus Myers plus Goldsborough too. Neither Boyd nor Myers nor Goldsborough suggest any desirability of combining with one or both of the others.

It is respectfully submitted that the rejection is hereby traversed and claims 280 and 292 are allowable

Claim 282 is rejected as unpatentable over Boyd in view of Myers and further in view of JP63-235648.

Claim 282 is deleted and its features combined into claim 281. Please see arguments against rejection of independent claims 221 and 277 over Boyd in view of Myers above, and also the general comments on JP 648, further above. Like Goldsborough, JP 648 shows only a refractory / ceramic lining to the combustion volume, this time to part of the volume, over the piston crown, attached by a fastener. Ceramics are a well known materials group. Fasteners are common. Claims 281 is a dependent claim, calling for the **particular components of independent claim 277** to be constructed in a certain manner. If independent claim 277 is allowable, so is dependent claim 281.

None of the citations discloses the key limitations of claim 277. They are: “. . . an exterior surface, a structure and a cylinder assembly having at least one internal circumferential depression all substantially located within said surface . . . . said component having at least one circumferential external projection reciprocable in said depression, in operation said projection and depression forming at least one pair of toroidal fluid working chambers of cyclically variable capacity . . . . said structure being in proximity to and at least partially surrounding portion of said cylinder assembly and including insulating material to restrict heat transfer from said assembly”. Therefore Boyd plus Myers plus JP 648, whether obvious or not, does not read on claim 277, and it should be allowed. If claim 277 is allowable, so are its dependent claims.

The applicant maintains that the combination of Boyd and Myers and JP 648 is **not** obvious, for reasons largely identical to those given under the previous two rejections. JP 648 discloses none of the features of independent claim 277. This application does not disclose linings for caps to pistons. Therefore, the arguments under the MPEP 2143 and 2145 guidelines and the Graham Inquiries on Boyd plus Myers in relation to independent claims 198 and 277 and their dependent claims, which were made above, establish the non-obviousness of Boyd plus Myers plus JP 648 too. Neither Boyd nor Myers nor JP 648 show any desirability of combining with one or both of the others.

It is respectfully submitted that the rejection is hereby traversed and claim 282 is allowable.

Claim 201 is rejected as unpatentable over Gould in view of Myers and further JP63-235648.

Please see arguments against the first of the rejections due to obviousness, that of independent claim 198 and its dependent claims, over Gould in view of Myers above, and also the general comments on JP 648, further above. JP 648 shows only a refractory / ceramic lining to the combustion to part of the combustion volume, over the piston crown, attached by a fastener.



Ceramics are a well known materials group. Fasteners are common. Claims 201 is a dependent claim, calling for the **particular components of independent claim 198** to be of ceramic material. If independent claim 198 is allowable, so is dependent claims 201.

None of the citations discloses the key limitations of claim 198. They are: *"A device for the working of fluids, said device substantially defined by a casing having an exterior surface, said casing at least partly supporting and enclosing a cylinder assembly comprising a cylinder with two heads or ends and at least one internal circumferential depression, said assembly containing a component with at least one external circumferential projection . . . . said casing including insulating material for the purpose of restricting heat transfer from said assembly"*. Therefore Gould plus Myers plus JP 648, whether obvious or not, does not read on claim 198, and it should be allowed. If claim 198 is allowable, so are its dependent claims.

The applicant maintains that the combination of Gould and Myers and JP 648 is **not** obvious, for reasons largely identical to those given under the first specific rejection for obviousness. JP 648 discloses none of the features of independent claim 198. This application does not disclose linings for caps to pistons. Therefore, the arguments under the MPEP 2143 and 2145 guidelines and the Graham Inquiries on Gould plus Myers in relation to claims 198 and its dependent claims, which were made above, establish the non-obviousness of Gould plus Myers plus JP 648 too. Neither Gould nor Myers nor JP 648 show any desirability of combining with one or both of the others.

It is respectfully submitted that the rejection is hereby traversed and claim 201 is allowable

Claims 198, 204 and 205 are rejected as unpatentable over Arney in view of Myers.

The applicant argues below that claim 198 as it stood before the examiner could not be rejected for obviousness. Nevertheless, he has amended some of its wording to further distinguish over Myers, as given above.

Please see the general comments on Myers and Arney above. Arney discloses an entirely different engine from that of claim 198, the only shared feature being toroidal working chambers.

Independent claim 198 was amended in response to the last office action of 15<sup>th</sup> August 2006, to more clearly distinguish over Iver, and therefore it will also more clearly distinguish over the somewhat similar Myers.

Arney discloses only toroidal working chambers, and two reciprocating components or pistons linked by a hollow shaft, the piston assembly mounted on a second hollow shaft within the first. The second shaft, which has an internal passage, and the cylinder are both fixed. The piston rotates in unison with an internal shaft, but reciprocates relative to it. The shaft rotates within a fixed cylinder. Myers shows a heat dissipater or radiator in an engine compartment or hood, which has thermal insulation to prevent water freezing in the engine compartment. Both compartment and radiator are entirely separate to the engine.

As noted above:

It would appear that Myers insulation is not to reduce noise, as maintained in the

rejection (page 4, line 22) but to provide some thermal insulation to prevent water in the heat dissipater from freezing. The applicant disagrees that "housing", in the context of claim 198 as it then stood could include a building or separate structure. The Oxford American Dictionary defines "housing" inter alia as: 3) "a rigid casing, esp. for moving or sensitive parts of a machine". Please note that, during the applicant's last response, claim 198 was amended to read ". . . . having an integral housing at least partly supporting and substantially enclosing a cylinder assembly . . ." and absolutely distinguishes over the hood insulation of Myers. In this response, 'housing' in the claims is changed to "casing", to further distinguish over Boyd plus Myers.

It is agreed that Arney shows substantially identical components arranged in mirror image about each other. However claim 204 is a dependent claim, and would be allowable if claim 198 is allowable, as the applicant avers. It is agreed that Arney shows an internal passage, but it is in a fixed shaft. Claim 205 in combination with 198 clearly reads on a passage in the reciprocating or moving component.

The examiner says it is obvious to combine Arney with Myers "to reduce noise" (page 6, line2). The applicant feel the matter of noise is not relevant to the disclosure and claims, and that the invention's principle objectives show no special motivation to reduce noise.

The applicant further maintains that the combination of Arney and Myers is not obvious. Using the MPEP 2143 and 2145 guidelines on obviousness and making the MPEP 2141 Graham Inquiries on Boyd plus Myers, with reference to independent claim 198 as modified earlier this year:

- (1) There is no suggestion of motivation by Arney to combine with the separate heat dissipater and hood compartment with insulated lining of Myers, nor to include the thermally insulating casing of claim 198. There is no suggestion of motivation by Myers to build the engine of Arney, nor the engine of claim 198, nor indeed any engine.
- (2) There is no reasonable expectation of success in combining Myers with Arney or with claim 198, since Myers art, with its recycling of coolant water heat back to the air intake and elimination of ambient air flow, is unworkable in practice.
- (3) None of the citations discloses the key limitations of claim 198. They are: ". . . said device substantially defined by a casing having an exterior surface, said casing at least partly supporting and enclosing a cylinder assembly comprising a cylinder with two heads or ends and at least one internal circumferential depression, said assembly containing a component with at least one external circumferential projection, said projection reciprocable in said depression . . . . said casing including insulating material for the purpose of restricting heat transfer from said assembly. . Therefore Arney plus Myers, whether obvious or not, does not read on claim 198, and it should be allowed. If claim 198 is allowable, so are its dependent claims.
- (I) Arney "teaches away" from the present disclosure in that the moving parts of his engine relate to one another in a quite different way and are of different geometric layout. Myers "teaches away" to only disclose heat dissipation / cooling means for an undescribed / unspecified engine.
- (II) The disclosure and claims proceed contrary to the conventional wisdom of providing

heat dissipation or cooling means for engines. The conventional wisdom is embraced by Arney, with his depiction of cooling fins.

- (A) Myers is non-analogous and non-pertinent art, since it relates to an optional "aftermarket" or outboard heat dissipater for a separate engine. Independent claims 198 and 277 relate to un-cooled engines having effectively integral thermally insulating casings or structures, and read on heat retention, not heat dissipation. Arney is an entirely different engine, wherein two pistons linked by a hollow shaft reciprocate about a second fixed shaft located interiorly of the first. In the present disclosure there is no major component within the piston that moves relative to it. Claim 198 does not describe motion of one component relative to another. Neither Myers' nor Arney's disclosures are in any way pertinent to the problem with which the inventor is here concerned: how to build un-cooled engines and as far as possible eliminate heat dissipation from the combustion chamber.
- (B) Myers has none of the features of independent claim 198. The insulation is to a hood enclosure, entirely separate from an engine, and is for purpose of preventing the water in the heat dissipater from freezing. Unlike Myers, claims 198 and 277 describe a casing enclosing or a structure within an engine, which has no heat dissipater, and where thermal insulation is included in the casing or structure to **restrict** heat dissipation. Arney shows only toroidal working chambers. He does not show key claim 198 features set out under item (3) above.. Neither Arney nor Myers suggest any desirability of combining with the other.
- (C) There are essentially no persons having **ordinary** skill in the art of building un-cooled engines. Even if there were, they would never arrive at the optional aftermarket and outboard heat dissipater and hood enclosure of Myers in combination with the entirely different engine of Arney, with its prominent cooling fins radiating from the cylinder. to design and build the un-cooled engine of claims 198, having a thermally insulating casing which encloses the cylinder.
- (D) As noted above, the present unique and distinctive invention meets long felt but unsolved needs.

Notwithstanding the arguments above, principally relating to claims before the examiner when he made the rejection, independent claim 198 is been amended to **further distinguish** over Arney plus Myers,

It is respectfully submitted that the rejection is hereby traversed and independent claim 198 is allowable, and therefore dependent claims 204 and 205 are allowable too.

Claims 201 and 215 are rejected as unpatentable over Gould in view of Myers and further Goldsborough.

Please see arguments against the first of the rejections due to obviousness, that of independent claim 198 and its dependent claims, over Gould in view of Myers above, and also the general comments on Goldsborough, further above. Goldsborough shows only a refractory / ceramic lining on the inside of the cylinder. Ceramics are a well known materials group. Claims 201 and

215 are dependent claims, calling for the **particular components of independent claim 198** to be of ceramic material, and to contain an electrical circuit. If independent claim 198 is allowable, so are dependent claims 201 and 215.

None of the citations discloses the key limitations of claim 198. They are: ". . . device having an integral (~~housing~~) casing at least partly supporting and substantially enclosing a cylinder assembly comprising a cylinder with at least one circumferential depression, said assembly containing a component with at least one external circumferential projection, said external circumferential projection reciprocable in said internal circumferential depression . . . . said (~~housing~~) casing including deliberately provided substantially insulating material for the purpose of restricting heat transfer from said assembly. Therefore Gould plus Myers plus Goldsborough, whether obvious or not, does not read on claim 198, and it should be allowed. If claim 198 is allowable, so are its dependent claims.

The applicant maintains that the combination of Gould and Myers and Goldsborough is not obvious, for reasons largely identical to those given under the previous rejection. Goldsborough discloses none of the features of independent claim 198. This application does not disclose linings to the insides of cylinders. Therefore, the arguments under the MPEP 2143 and 2145 guidelines and the Graham Inquiries on Gould plus Myers in relation to independent claim 198 and its dependent claims, which were made above, establish the non-obviousness of Gould plus Myers plus Goldsborough too. Neither Gould nor Myers nor Goldsborough suggest any desirability of combining with one or both of the others.

It is respectfully submitted that the rejection is hereby traversed and claims 201 and 215 are allowable

Claims 221, 226, 229-231, 237, 240, 277, 278 and 285 are rejected as unpatentable over DE 3607421 A1 in view of Myers.

The applicant argues below that claims 221 and 277 as they stood before the examiner could not be rejected for obviousness. Nevertheless, he has substantially amended the claims, which now clearly differentiate over DE 421 in view of Myers.

Please see the general comments on Myers and DE 421 above. Boyd discloses an entirely different engine from that of claim 198, the only shared feature being toroidal working chambers.

Independent claims 221 and 277 were amended in response to the last office action of 15<sup>th</sup> August 2006, to more clearly distinguish over Iver, and therefore they would also more clearly have distinguished over the somewhat similar Myers.

DE 421 discloses only a piston with two cylindrical extremities (claim 221) and toroidal chambers (claim 277). It shows a fluid cooling jacket surrounding the cylinder, in conflict with the present disclosure and claims. Myers shows a heat dissipater or radiator in an engine compartment or hood, which has thermal insulation to prevent water freezing in the engine compartment. Both compartment and radiator are entirely separate to the engine.

It would appear that Myers insulation is not to reduce noise, as maintained in the rejection (page 6, line 11) but to provide some thermal insulation to prevent water in the heat dissipater from freezing. Please note that, during the applicant's last response, independent claim 221 was amended to read ". . . . having an integral housing at least partly supporting and substantially enclosing a cylinder assembly . . . ." and clearly distinguishes over the hood insulation of Myers. Claim 277 was also amended at that time. In this response, 'housing' in the claims is changed to "casing", to further distinguish over DE 421 plus Myers.

The applicant maintains that the combination of DE 421 and Myers is **not** obvious. Using the MPEP 2143 and 2145 guidelines on obviousness and making the MPEP 2141 Graham Inquiries on DE 421 plus Myers, with reference to the independent claims as modified earlier this year:

- (1) There is no suggestion of motivation by DE 421 to combine with the separate heat dissipater and hood compartment with insulated lining of Myers, nor to include the thermally insulating casing of claim 198. There is no suggestion of motivation by Myers to build the engine of DE 421, nor the engine of claim 198, nor indeed any engine.
- (2) There is no reasonable expectation of success in combining Myers with DE 421 or with claim 198, since Myers art, with its recycling of coolant water heat back to the air intake and elimination of ambient air flow, is unworkable in practice.
- (3) The key limitations in independent claims 221 and 277 before this amendment do not relate to DE 421 and / or Myers in any way. They are: (claim 221) ". . . said head portion being separated from and pierced by said passage, said housing including insulating material for the purpose of restricting heat transfer from said assembly.", and (claim 277) ". . . . an exterior surface, said device including a structure and a cylinder assembly having at least one internal circumferential depression all substantially located within said surface, said assembly containing a component having . . . . at least one circumferential external projection reciprocable in said depression . . . .said structure being in proximity to and at least partially surrounding portion of said cylinder assembly and including insulating material to restrict heat transfer from said assembly. . . said structure at least partially surrounding portion of said cylinder assembly and including insulating material to restrict heat transfer from said assembly . . .". Therefore DE 421 plus Myers, whether obvious or not, does not read on either claim 221 or claim 277, and they should be allowed. If claims 221 and 277 are allowable, so are their dependent claims.
- (I) DE 421 "teaches away" from the present disclosure in that it shows a fluid cooling jacket surrounding the cylinder. Myers "teaches away" to only disclose heat dissipation / cooling means for an undescribed / unspecified engine.
- (II) The disclosure and claims proceed contrary to the conventional wisdom of providing heat dissipation or cooling means for engines, clearly embraced by DE 421 in its depiction of a fluid cooling jacket around the cylinder.
- (A) Myers is non-analogous and non-pertinent art, since it relates to an optional "aftermarket" or outboard heat dissipater for a separate engine. Independent claims 198 and 277 relate to un-cooled engines having integral thermally insulating housings or structures, and read on heat retention, not heat dissipation. Neither Myers' nor DE 421's disclosures

are in any way pertinent to the problem with which the inventor is here concerned: how to build integral un-cooled engines and as far as possible eliminate heat dissipation from the combustion chamber.

- (B) Myers has none of the features of independent claims 221 and 277. The insulation is to a hood enclosure, entirely separate from an engine, and is for purpose of preventing the water in the heat dissipater from freezing. Unlike Myers, claims 221 and 277 describe a casing or a structure which is effectively an integral portion of an engine, which has no heat dissipater, and where thermal insulation is included in the housing or structure to **restrict** heat dissipation. DE 421 shows only toroidal working chambers and a reciprocating component with two cylindrical ends and an internal passage. It does not show key claim 221 and 277 features, as set out under item (3) above. Neither DE 421 nor Myers suggest any desirability of combining with the other.
- (C) There are essentially no persons having **ordinary** skill in the art of building un-cooled engines. Even if there were, they would never arrive at the optional aftermarket and outboard heat dissipater and hood enclosure of Myers in combination with the entirely different engine of De 421 with its fluid cooling jacket to design and build the un-cooled engines of claims 221 and 277, having a thermally insulating casing or structure.
- (D) As noted above, the present unique and distinctive invention meets long felt but unsolved needs.

As noted, the point of imperfections during machining was raised by the examiner during his meeting with the applicant, who subsequently in the response of 12<sup>th</sup> February 2007 amended claim 229 to recite a "small deliberately manufactured depression". The applicant respectfully avers that "deliberately" in combination with "manufactured" overcomes the examiner's objections. (In patent 7 117 827, the examiner allowed claim 26, which recites a "manufactured depression", without mention of "deliberately".)

Concerning claim 285, the examiner mentions Gould, not part of the prior art of this rejection. DE 421 shows no passage for exhaust gas volume within the engine (the volume is for charge air supply), nor surrounding the cylinder, and no exhaust pipe outside the engine (it only shows a port in the cylinder. Myers does not show any exhaust volume within the engine, only a conventional exhaust pipe. It is not clear to the applicant how placing DE 421's engine, with no exhaust pipe, anywhere in Myers' "hood" space could read on claim 285. Claim 285 is herewith amended and modified to further distinguish over DE 421 plus Myers, as well as Gould plus Myers, as are claims 207, 230, 256 and 307. As noted, the applicant is not aware of any past or present production vehicles with thermal insulation to exhaust pipes (as distinct from protective shields in local locations to prevent accidental burning to someone making an engine inspection or adjustment).

Notwithstanding the arguments above, relating to claims before the examiner when he made the rejection, independent claims 221 and 277 have been amended to **further distinguish** over DE 421 plus Myers,

It is respectfully submitted that the rejection is hereby traversed and independent claims 221 and 277 are allowable, and therefore their dependent claims are allowable too.

Claims 224, 225 and 235 are rejected as unpatentable over DE 3607421 1A in view of Myers and Goldsborough.

Please see arguments against rejection of the claims immediately above, and also the general comments on Goldsborough, further above. Goldsborough shows only a refractory / ceramic lining on the inside of the cylinder. Ceramics are a well known materials group. Claims 280 and 292 are dependent claims, calling for the **particular components of independent claim 277** to be of ceramic material. If independent claim 277 is allowable, so are dependent claims 280 and 292.

None of the citations show the key limitations of independent claim 221, as amended herein. They are: ". . .said head portion being separated from and pierced by said passage during at least part of said cycle, said casing including insulating material for the purpose of restricting heat transfer from said assembly, said device having no purposely designed means for transferring heat from said assembly, such means including fluid circulating in a jacket adjacent to said assembly or cooling fins radiating from said assembly". Therefore DE 421 plus Myers plus Goldsborough, whether obvious or not, does not read on claim 221, and it should be allowed. If claim 221 is allowable, so are their dependent claims 224, 225 and 235.

The applicant maintains that the combination of DE 421 and Myers and Goldsborough is **not** obvious, for reasons largely identical to those given under the previous rejection. Goldsborough discloses none of the features of independent claim 277. This application does not disclose linings to the insides of cylinders. Therefore, the remarks under the MPEP 2143 and 2145 guidelines and the Graham Inquiries on Boyd plus Myers in relation to independent claims 198 and 277 and their dependent claims, which were made above, establish the non-obviousness of Boyd plus Myers plus Goldsborough too. Neither DE 421 nor Myers nor Goldsborough suggest any desirability of combining with one or both of the others.

It is respectfully submitted that the rejection is hereby traversed and claims 224, 225 and 235 are allowable.

Claims 227 and 238 are rejected as unpatentable over DE 3607421 1A in view of Myers and JP63-235648.

Claims 227 and 238 are cancelled. Their features have been incorporated in claims 226 and 237.

Please see arguments against rejection of independent claim 221 and its dependent claims over DE 421 in view of Myers above, and also the general comments on JP 648, further above. Like Goldsborough, JP 648 shows only a refractory / ceramic lining to the combustion volume, this time to part of the volume, over the piston crown, attached by a fastener. Ceramics are a well known materials group. Fasteners are common. Claims 227 and 238 are dependent claims, calling for the **particular components of independent claim 221** to be assembled in a certain manner. If independent claim 221 is allowable, so are dependent claims 227 and 238.

None of the citations show the key limitations of independent claim 221, as amended herein. They are: ". . .said head portion being separated from and pierced by said passage during at least part of said cycle, said casing including insulating material for the purpose of restricting heat transfer

*from said assembly, said device having no purposely designed means for transferring heat from said assembly, such means including fluid circulating in a jacket adjacent to said assembly or cooling fins radiating from said assembly". Therefore DE 421 plus Myers plus JP 648, whether obvious or not, does not read on claim 221, and it should be allowed. If claims 221 is allowable, so are dependent claims 226 and 237.*

The applicant maintains that the combination of DE 421 and Myers and JP 648 is **not** obvious, for reasons largely identical to those given under the previous two rejections. JP 648 discloses none of the features of independent claim 221. This application does not disclose linings for caps to pistons. Therefore, the remarks under the MPEP 2143 and 2145 guidelines and the Graham Inquiries on DE 421 plus Myers in relation to independent claim 221 and its dependent claims, which were made above, establish the non-obviousness of DE421 plus Myers plus JP 648 too. Neither DE 421 nor Myers nor JP 648 suggest any desirability of combining with one or both of the others.

It is respectfully submitted that the rejection is hereby traversed and claims 226 and 237 are allowable.

Claims 358 / 359 / 361 are rejected as being unpatentable over Gould in view of Myers / DE 3607421 A1 in view of Myers / Boyd as applied to claims 208 / 231 / 286 above, and further in view of Butler (2 218 522).

Please note the general comments on Myers, Gould, Boyd, DE 421, and Butler above.

The claims cited are indirectly dependent on independent claims 198, 221 and 277, which are herewith modified in the this response. See attached schedules of claims.

Please see arguments against rejection of independent claims 198 and its depended claims over Gould in view of Myers, against rejection of independent claim 221 and its dependent claims over DE 421 in view of Myers, against rejection of independent claim 277 and its dependent claims over Boyd in view of Myers, all above. The arguments made there are applicable here too, and are herewith made in this rejection.

Concerning Butler, it is the applicants understanding that Butler shows two fuel delivery devices, each delivering a different fluid. In contrast, the rejected claims call for a **single** fluid delivery device "for delivery of at least two distinct fluids independently of one another."

None of the cited art has the limitations of independent claims 198, 221 and 277, as herein amended. They are: (Claim 198) ". . .said device substantially defined by a casing having an exterior surface, said casing at least partly supporting and enclosing a cylinder assembly . . . . said casing including insulating material for the purpose of restricting heat transfer from said assembly.", (claim 221) ". . . said chamber being separated from and pierced by said passage, said housing including insulating material for the purpose of restricting heat transfer from said assembly, said device having no purposely designed means for transferring heat from said assembly, such means including fluid circulating in a jacket adjacent to said assembly or cooling fins radiating from said assembly.", and (claim 277) ". . . . an exterior surface, said device including a structure and a cylinder assembly having at least one internal circumferential depression all substantially located



*within said surface, said assembly containing a component having . . . . at least one circumferential external projection reciprocable in said depression . . . .said structure being in proximity to and at least partially surrounding portion of said cylinder assembly and including insulating material to restrict heat transfer from said assembly. . . said structure at least partially surrounding portion of said cylinder assembly and including insulating material to restrict heat transfer from said assembly". Therefore any combination of the above citations, whether obvious or not, does not read on independent claims 198, 221 or claim 277, and they should be allowed. If claims 198, 221 and 277 are allowable, so are their dependent claims.*

The applicant maintains that the combination of the above citations is **not** obvious, for reasons largely identical to those given under the previous rejections. The remarks under the MPEP 2143 and 2145 guidelines and the Graham Inquiries on the listed citations in relation to independent claims 198, 221 and 277 and their dependent claims, which were made above, establish the non-obviousness of the cited art too. None of the separate prior arts cited above suggests any desirability of combining with any of the others.

It is respectfully submitted that the rejection is hereby traversed and claims 358, 359 and 361 are allowable.

Claims 367 / 368 / 371 are rejected as being unpatentable over Gould in view of Myers / DE 3607421 A1 in view of Myers / Boyd as applied to claims 208 / 231 / 286 above, and further in view of Hoxton (1 620 100).

Please note the general comments on Myers, Gould, Boyd, DE 421, and Hoxton above.

The claims cited are indirectly dependent on independent claims 198, 221 and 277, which are herewith modified in the this response. See attached schedule of annotated claims.

Please see arguments against rejection of independent claims 198 and its depended claims over Gould in view of Myers, against rejection of independent claim 221 and its dependent claims over DE 421 in view of Myers, against rejection of independent claim 277 and its dependent claims over Boyd in view of Myers, all above. The arguments made there are applicable here too, and are herewith made in this rejection.

Concerning Hoxton, it is acknowledged that it shows a means for restricting exhaust gas flow, in an exhaust system separate from and located downstream of an engine. It is submitted that Hoxton is non-analogous and non-pertinent art, since it relates to the art of engine braking, nowhere mentioned in this disclosure, as opposed to the art of emissions reactors and their warm-up, as disclosed herein. There is no suggestion of motivation by Hoxton to regulate emissions, to build the engine of independent claims 198, 221 and 277 or the engines of any of the citations, nor indeed any engine.

None of the cited art has the limitations of independent claims 198, 221 and 277, as herein amended. They are: (Claim 198) ". . .said device substantially defined by a casing having an exterior surface, said casing at least partly supporting and enclosing a cylinder assembly . . . . said casing including insulating material for the purpose of restricting heat transfer from said assembly.", (claim 221) ". . .said head portion being separated from and pierced by said passage during at least

part of said cycle, said casing including insulating material for the purpose of restricting heat transfer from said assembly, said device having no purposely designed means for transferring heat from said assembly, such means including fluid circulating in a jacket adjacent to said assembly or cooling fins radiating from said assembly.”, and (claim 277) “. . . . an exterior surface, said device including a structure and a cylinder assembly having at least one internal circumferential depression all substantially located within said surface, said assembly containing a component having . . . . at least one circumferential external projection reciprocable in said depression . . . .said structure being in proximity to and at least partially surrounding portion of said cylinder assembly and including insulating material to restrict heat transfer from said assembly. . . said structure at least partially surrounding portion of said cylinder assembly and including insulating material to restrict heat transfer from said assembly . . .”. Therefore any combination of the above citations, whether obvious or not, does not read on independent claims 198, 221 or claim 277, and they should be allowed. If claims 198, 221 and 277 are allowable, so are their dependent claims.

The applicant maintains that the combination of the above citations is not obvious, for reasons largely identical to those given under the previous rejections. The remarks under the MPEP 2143 and 2145 guidelines and the Graham Inquiries on the listed citations in relation to independent claims 198, 221 and 277 and their dependent claims, which were made above, establish the non-obviousness of the cited art too. None of the separate prior arts cited above suggests any desirability of combining with any of the others.

It is respectfully submitted that the rejection is hereby traversed and claims 367, 368 and 370 / 371 are allowable.

Claims 321, 323, 325, 326, 328 - 330, 332, 333, 336, 339 and 340 are rejected as unpatentable over Gould in view of Berger.

The applicant argues below that claim 321 as it stood before the examiner could not be rejected for obviousness. Nevertheless, he has amended claim 321, as given below, to further distinguish over Berger.

321 (Currently Amended) A device for the working of fluids defined by an exterior surface, said device including substantially within said surface (comprising) a structure, a cylinder assembly, a component reciprocable within said assembly (,) and filamentary material, said component having at least one external circumferential projection, said cylinder assembly having at least one internal circumferential depression in which said projection is positioned to reciprocate, in operation said projection and depression defining a pair of toroidal fluid working chambers of cyclically variable capacity, said structure located outside said cylinder assembly and within said exterior surface, said structure together with said assembly at least partly defining a volume for passage of fluids to or from said working chambers, said volume containing said filamentary material and at least partly surrounding portion of said cylinder assembly.

Please see the general comments on Gould and Berger above.

Gould recites only a pair of toroidal working chambers, and a fixed shaft within a piston

reciprocating piston which also rotates synchronously with the cylinder, the shaft having at least one internal passage. Gould shows nothing outboard of the cylinder assembly, but shows a possible exhaust processing volume, without filamentary material, inside a shaft which is inside the piston, which is in turn inside the cylinder. Berger discloses an exhaust processing system outboard an engine, the system being linked to the engine via exhaust pipe connected to an engine manifold. Part of the volume of Berger's system includes filamentary material.

It is noted that in the office action mailed 13<sup>th</sup> August 2006, claims 335, 334 - 336, 338 - 341 were listed as rejected but no reason for rejection given in that action. Independent claim 321 was substantially modified in the applicant's response filed 12<sup>th</sup> February 2007.

Claim 321 is hereby further modified in this response, as shown above.

Considering claim 321 as modified in this response, the applicant maintains that the combination of Gould and Berger is **not** obvious. Using the MPEP 2143 and 2145 guidelines on obviousness and making the MPEP 2141 Graham Inquiries on Gould plus Berger:

- (1) There is no suggestion of motivation by Gould to combine with the separate outboard exhaust processing system of Berger. There is no suggestion of motivation by Berger to build the engine of Gould, nor the engine of claim 321, nor indeed any engine.
- (3) Neither Gould nor Berger in any way discloses key limitations of claim 321. They are: *"...an exterior surface, said device including substantially within said surface a structure, a cylinder assembly, a component reciprocable within said assembly and filamentary material, said component having at least one external circumferential projection, said cylinder assembly having at least one internal circumferential depression in which said projection is positioned to reciprocate . . . . said structure located outside said cylinder assembly and with said assembly at least partly defining a volume for passage of fluids to or from said working chambers, said volume . . . . . at least partly surrounding portion of said cylinder assembly."* Therefore, the combination of Gould and Berger, whether obvious or not, does not read on claim 321, and it should be allowed. If claim 321 is allowable, so are its dependent claims.
- (i) Gould "teaches away" from the present disclosure in that the moving parts of his engine relate to one another in a quite different way and are of different geometric layout. Berger "teaches away" to only disclose a separate exhaust processing system out board of an engine. In Berger, the complete engine can be entirely removed from the exhaust system or, alternatively, Berger's exhaust system can be removed to be replaced by another, without affecting the engine in any way.
- (ii) The disclosure and claims proceed contrary to the conventional wisdom of providing a separate exhaust emission system for engines, typically linked to the engine solely by an exhaust pipe and / or manifold bolted to the exterior of the engine. The applicant feels it is a great inventive step to locate the exhaust system entirely within the engine. To his knowledge, this has never been mooted, tried or built before. The effectiveness of an exhaust emissions system is generally proportional to the temperature at which it operates; the higher the temperature, the better. The conventional constructions of today all involve metal pipes or manifolds outboard of the engine, which radiate and dissipate large amounts of heat, so instantly and rapidly cooling the exhaust gases and

slowing the reactions within. It is estimated that temperatures in the exhaust system of the invention will be at least double of those possible with conventional outboard constructions. (See also under (D) below.) The present disclosure further proceeds contrary to the conventional wisdom of providing a cooling system for engines, in that it discloses engines entirely without cooling.

- (A) Neither Gould nor Berger is "reasonably pertinent to the particular problem with which the inventor was concerned". Here, the inventor is concerned with building un-cooled engines and as far as possible eliminating heat dissipation from the combustion chamber, and additionally with exhaust processing systems located entirely within an engine. Gould shows nothing outboard of the cylinder assembly, but shows a possible exhaust processing volume inside a fixed shaft inside the piston and about which the piston reciprocates and rotates. Gould shows no filamentary material. Berger discloses no particulars of any engine. Berger shows an exhaust processing volume with filamentary material entirely separate from the engine and connected to it via exhaust piping, shows no details of engine construction, and nowhere suggests an exhaust processing volume adjacent to and surrounding a cylinder. Neither Gould nor Berger suggest any desirability of combining with the other.
- (B) Neither Gould nor Berger discloses the important features of claim 321, as set out under item (3) above.
- (C) A person having **ordinary** skill in the art of building cooled conventional engines would never conceive of combining Berger with Gould to deploy an exhaust processing volume in the space now occupied by the cooling fins or water jacket in cooled engines, nor would they conceive of locating the exhaust processing system entirely within the engine. Gould's engine layout is especially awkward for the placement of an exhaust processing volume surrounding the cylinder.
- (D) As noted under the heading above "Obviousness- General Arguments", the present unique and distinctive invention meets long felt but unsolved needs, in that it provides a means to radically reduce both fuel use and CO<sub>2</sub> emissions. It also meets another long felt but unsolved need, how to so drastically cleanse exhaust gases to meet the super-draconian emissions laws in the US, Japan, Europe and elsewhere. The difficulties of meeting these laws, especially as regards NO<sub>x</sub> for diesels, are well documented. The large increase in processing temperatures made possible by the invention will increase cleansing performance many times. (In many of the relevant chemical reactions, doubling the temperature would increase reaction speeds many fold. The dwell time of gas in a system is fixed or finite, so increasing reaction speeds many fold would mean so much more cleansing work can be accomplished in a given time.)

It is respectfully submitted that the rejection is hereby traversed and that independent claim 321, together with its dependent claims, be allowed.

Claims 321, 327 and 341 are rejected as unpatentable over Arney in view of Berger.

Please see the general comments on Arney and Berger above.

Arney recites only a pair of toroidal working chambers, and a component rotating and

reciprocating in a cylinder. Berger discloses an exhaust processing system outboard and engine, the system being linked to the engine via exhaust pipe connected to an engine manifold. Part of the volume of Berger's system includes filamentary material.

Neither Arney nor Berger in any way discloses the key limitations of independent claim 321, as herewith amended: They are: ". . . an exterior surface, said device including substantially within said surface a structure, a cylinder assembly, a component reciprocable within said assembly and filamentary material, said component having at least one external circumferential projection, said cylinder assembly having at least one internal circumferential depression in which said projection is positioned to reciprocate . . . . said structure located outside said cylinder assembly and with said assembly at least partly defining a volume for passage of fluids to or from said working chambers, said volume . . . . at least partly surrounding portion of said cylinder assembly." Therefore the combination of Arney and Berger, whether obvious or not, does not read on claim 321 and it should therefore be allowed. If claim 321 is allowable, dependent claims 327 and 341 are allowable too.

Considering claim 321, as modified in this response, the applicant maintains that the combination of Arney and Berger is **not** obvious. Using the MPEP 2143 and 2145 guidelines on obviousness and making the MPEP 2141 Graham Inquiries on Arney plus Berger, would give rise to arguments identical to those immediately above, with Arney substituted for Gould, and these are herewith submitted. Like Gould, Arney does not recite key features of claim 321 as herewith amended: the exhaust processing system with filamentary material located entirely **within** an engine, the component having projections reciprocating in depressions in a cylinder. None of the citations suggests any desirability of combining with any of the others.

Concerning dependent claims 327 and 341, Arney does show the identical mirrored components and a port located between them. However, if claim 321 is allowable, as the applicant avers, then dependent claims 327 and 341 are allowable too.

It is respectfully submitted that the rejection is hereby traversed.

Claim 322 is rejected as unpatentable over Gould in view of Berger and Myers.

Please see the general comments on Myers, Gould and Berger above.

Gould recites only a pair of toroidal working chambers, and a fixed shaft within a piston reciprocating piston which also rotates synchronously with the cylinder, the shaft having at least one internal passage. Gould shows nothing outboard of the cylinder assembly, but shows a possible exhaust processing volume, without filamentary material, inside a shaft which is inside the piston, which is in turn inside the cylinder. Berger discloses an exhaust processing system outboard an engine, the system being linked to the engine via exhaust pipe connected to an engine manifold. Part of the volume of Berger's system includes filamentary material. Myers shows a heat dissipater and a separate engine, both in an enclosing "hood" having thermal insulation.

Neither Gould nor Berger nor Myers in any way discloses the key limitations of independent claim 321, as herewith amended: They are: ". . . an exterior surface, said device including substantially

*within said surface a structure, a cylinder assembly, a component reciprocable within said assembly and filamentary material, said component having at least one external circumferential projection, said cylinder assembly having at least one internal circumferential depression in which said projection is positioned to reciprocate . . . . said structure located outside said cylinder assembly and with said assembly at least partly defining a volume for passage of fluids to or from said working chambers, said volume . . . . . at least partly surrounding portion of said cylinder assembly."* Additionally, claim 322 shows: *"a casing, wherein said exterior surface is substantially that of said casing"*, nowhere found in the citations. Therefore the combination of Gould plus Berger plus Myers, whether obvious or not, does not read on claim 321 and it should therefore be allowed. If claim 321 is allowable, dependent claim 322 is allowable too.

Considering claim 321 **as modified in this response**, the applicant maintains that the combination of Gould, Berger and Myers is **not** obvious. Using the MPEP 2143 and 2145 guidelines on obviousness and making the MPEP 2141 Graham Inquiries on Gould plus Berger, would give rise to arguments identical to those under the rejection of claim 321 and eleven of its dependent claims, and these are herewith submitted. Myers is non-analogous and non-pertinent art, and shows none of the limitations of claim 321. None of the citations suggests any desirability of combining with any of the others.

It is respectfully submitted that the rejection is hereby traversed and that claim 322 be allowed.

Claims 324, 331, 334 and 338 are rejected as unpatentable over Gould in view of Berger and Goldsborough.

Please see the general comments on Gould, Goldsborough and Berger above.

Gould recites only a pair of toroidal working chambers, and a fixed shaft within a reciprocating piston which also rotates synchronously with the cylinder, the shaft having at least one internal passage. Gould shows nothing outboard of the cylinder assembly, but shows a possible exhaust processing volume, without filamentary material, inside a shaft which is inside the piston, which is in turn inside the cylinder. Berger discloses an exhaust processing system outboard an engine, the system being linked to the engine via exhaust pipe connected to an engine manifold. Part of the volume of Berger's system includes filamentary material. Goldsborough shows a ceramic lining to the interior of a cylinder and on the surface of the piston.

None of Gould, Berger and Goldsborough show the key limitations of independent claim 321, as herein amended. They are: *". . . an exterior surface, said device including substantially within said surface a structure, a cylinder assembly, a component reciprocable within said assembly and filamentary material, said component having at least one external circumferential projection, said cylinder assembly having at least one internal circumferential depression in which said projection is positioned to reciprocate . . . . said structure located outside said cylinder assembly and with said assembly at least partly defining a volume for passage of fluids to or from said working chambers, said volume . . . . . at least partly surrounding portion of said cylinder assembly."* Therefore Gould plus Berger plus Goldsborough, whether obvious or not, does not read on claim 321, and it should be allowed. If claim 321 is allowable, so are dependent claims 324, 331, 334 and 338

Considering claim 321 as modified in this response, in combination with claims 324, 331, 334 and

338, the applicant maintains that the combination of Gould, Berger and Goldsborough is **not** obvious. Using the MPEP 2143 and 2145 guidelines on obviousness and making the MPEP 2141 Graham Inquiries on Gould plus Berger, would give rise to arguments identical to those under the rejection of claim 321 and eleven of its dependent claims, and these are herewith submitted. Goldsborough shows a ceramic linings to a cylinder and a piston, nowhere claimed herein. None of the citations suggests any desirability of combining with any of the others.

It is respectfully submitted that the rejection is hereby traversed and that claims 321, 324, 331, 334 and 338 be allowed.

Claim 363 is rejected as unpatentable as over Gould in view of Berger, as applied to claim 332 and further in view of Bulter.

Please note the general comments on Gould, Berger, and Butler above.

The claim cited is indirectly dependent on independent claim 321, which is herewith modified in the this response. See attached schedule of annotated claims.

Please see arguments against rejection of dependent claims 358, 359 and 361, above. The arguments made there are applicable here too, and are herewith made in this rejection.

Concerning Butler, it is the applicants understanding that Butler shows two fuel delivery devices, each delivering a different fluid. In contrast, the rejected claims call for a **single** fluid delivery device "for delivery of at least two distinct fluids independently of one another."

None of the cited art has the limitations of independent claim 321 as herein amended. They are: ". . . an exterior surface, said device including substantially within said surface a structure, a cylinder assembly, a component reciprocable within said assembly and filamentary material, said component having at least one external circumferential projection, said cylinder assembly having at least one internal circumferential depression in which said projection is positioned to reciprocate . . . . said structure located outside said cylinder assembly and with said assembly at least partly defining a volume for passage of fluids to or from said working chambers, said volume . . . . at least partly surrounding portion of said cylinder assembly". Therefore any combination of the above citations, whether obvious or not, does not read on independent claim 321, and it should be allowed. If claims 198, 221 and 277 are allowable, so are their dependent claims.

The applicant maintains that the combination of the above citations is **not** obvious, for reasons largely identical to those given under the previous rejections. The remarks under the MPEP 2143 and 2145 guidelines and the Graham Inquiries on the listed citations in relation to independent claims 198, 221 and 277 and their dependent claims, which were made above, establish the non-obviousness of the cited art too.

None of the separate prior arts cited above suggest any desirability of combining with any of the others.

It is respectfully submitted that the rejection is hereby traversed and claims 363 is allowable.

Claim 374 is rejected as being unpatentable over Gould in view of Berger as applied to claims 332 above, and further in view of Hoxton.

Please note the general comments on Gould, Berger and Hoxton above.

The claim cited is indirectly dependent on independent claim 321, which is herewith modified in the this response. See attached schedule of annotated claims.

Please see arguments against rejection of dependent claims 367, 368 and 370 / 371, above. The arguments made there are applicable here too, and are herewith made in this rejection.

Concerning Hoxton, it is acknowledged that it shows a means for restricting exhaust gas flow, located in an exhaust system outboard of and downstream an engine. It is submitted that Hoxton is non-analogous and non-pertinent art, since it relates to the art of engine braking, nowhere mentioned in this disclosure, as opposed to the art of emissions reactors and their warm-up, as disclosed herein. There is no suggestion of motivation by Hoxton to regulate emissions, or to build the engine of independent claim 321, or the engines of any of the citations, nor indeed any engine.

None of the cited art has the limitations of independent claim 321, as herein amended. They are: “. . .an exterior surface, said device including substantially within said surface a structure, a cylinder assembly, a component reciprocable within said assembly and filamentary material, said component having at least one external circumferential projection, said cylinder assembly having at least one internal circumferential depression in which said projection is positioned to reciprocate . . . . said structure located outside said cylinder assembly and with said assembly at least partly defining a volume for passage of fluids to or from said working chambers, said volume . . . . at least partly surrounding portion of said cylinder assembly”. Therefore any combination of the above citations, whether obvious or not, does not read on independent claim 321, and it should be allowed. If claim 321 is allowable, so are its dependent claims.

The applicant maintains that the combination of the above citations is **not** obvious, for reasons largely identical to those given under the previous rejections. The remarks under the MPEP 2143 and 2145 guidelines and the Graham Inquiries on the listed citations in relation to independent claim 321 and its dependent claims, which were made above, establish the non-obviousness of the cited art too.

None of the separate prior arts cited above suggest any desirability of combining with any of the others.

It is respectfully submitted that the rejection is hereby traversed and claim 374 is allowable.

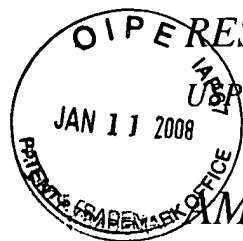
Please note that the arguments under the headings OBVIOUSNESS - GENERAL ARGUMENTS and GENERAL NOTES ON PRIOR ART CITATIONS are to be read in conjunction with, and form an integral part of, the arguments given under each of the individual rejections herein.



## OTHER MATTERS

*On page 1 of the Office Action, claims 344 through 348 were listed as rejected, but no reasons for rejection were given in the following pages. The applicant therefore assumes that claims 344 to 348 are allowable, if the claims on which they depend are also allowable.*

END OF RESPONSE



RESPONSE 11<sup>th</sup> January 2008 to Office Communication mailed 13<sup>th</sup> July 2007

USPTO Application 08 / 477 703 Mitja Hinderks 310 208 6606

## AMENDED CLAIMS

What is CLAIMED is:

(1 -197) Claims 1 to 197 are cancelled or renumbered, as noted in the Supplemental Amendment of 25<sup>th</sup> May 2006.

198 (Currently Amended) A device for the working of fluids, said device substantially defined by a casing having an exterior surface, said casing (~~having an integral housing~~) at least partly supporting and (~~substantially~~) enclosing a cylinder assembly comprising a cylinder with two heads or ends and at least one internal circumferential depression, said assembly containing a component with at least one external circumferential projection, said (~~external circumferential~~) projection reciprocable in said (~~internal circumferential~~) depression (~~and both cylinder and~~) said cylinder heads and said component having working surfaces partly defining at least one pair of toroidal fluid working chambers which in operation have cyclically variable capacity, said casing (~~housing~~) including insulating material for the purpose of restricting heat transfer from said assembly.

199 (Currently Amended) The device of claim 198, including means to mount said cylinder assembly in said (~~housing~~) casing to enable said cylinder assembly to rotate while said component is reciprocating in said cylinder assembly.

200 (Original) The device of claim 198, including means between said assembly and said component so as to cause said component to rotate relative to said assembly while reciprocating in said assembly.

201 (Original) The device of claim 198, wherein at least one of said cylinder assembly and said component is at least partly composed of ceramic material.

202 (Currently Amended) The device of claim 198, including at least one fastener, wherein at least one of said component and said cylinder assembly includes a multiplicity of elements

*held in assembled condition by said fastener loaded under tension.*

203 *(Cancelled) ~~The device of claim 198, including at least one fastener, said reciprocable component comprising a multiplicity of elements, said elements being held in assembled condition by said fastener loaded in tension.~~*

204 *(Original) The device of claim 198, wherein said assembly comprises at least one pair of substantially identical components arranged in mirror image about one another.*

205 *(Original) The device of claim 198, wherein said component defines a passage for fluids worked by said device.*

206 *(Original) The device of claim 198, including cylinder assembly surfaces and component surfaces at least partly defining said working chambers, at least one of said surfaces having at least one relatively small deliberately manufactured depression, said depression wholly fillable by fluids worked by said device.*

207 *(Currently Amended) The device of claim 198, including structure located at least in part outside said cylinder assembly and within said surface, said structure at least partly defining at least one volume for passage of fluids to or from at least one of said working chambers, said volume being adjacent to and at least partly surrounding portion of said cylinder assembly.*

208 *(Currently Amended) The device of claim 198, wherein said device is (~~part of~~) a reciprocating internal combustion engine and said working chambers are combustion chambers, said engine having a charge gas supply system, a fuel delivery apparatus and an emission control system for hot exhaust gas emitted from said engine when operative.*

209 *(Original) The device of claim 200, wherein said means comprise a guide and an endless track, said guide movable in said endless track, said track having a multiple wave-form configuration.*

210 *(Original) The device of claim 200, wherein said means comprise said component and said cylinder assembly defining complementary surfaces at least partly of an endless wave-like configuration.*

- 211 (Original) *The device of claim 200, including a rotatable shaft and a load transfer mechanism between said shaft and said rotatable and reciprocable component, wherein said mechanism comprises a hollow shaft with interior splines slidable on a shaft with external splines.*
- 212 (Original) *The device of claim 200, including a rotatable shaft and a load transfer mechanism between said shaft and said component, wherein said mechanism includes a bellows device.*
- 213 (Original) *The device of claim 200, including a rotatable shaft and a load transfer mechanism between said shaft and said component, wherein said mechanism includes at least one hinged element.*
- 214 (Original) *The device of claim 200, including a rotatable shaft and a load transfer mechanism between said shaft and said component, wherein said mechanism includes at least one pair of substantially parallel flanges separated by at least one roller, the flanges in operation moving laterally relatively to one another.*
- 215 (Original) *The device of claim 201, including at least one electrical circuit within said ceramic material.*
- 216 (Original) *The device of claim 202, wherein said fastener is of tubular form.*
- 217 (Cancelled) ~~*The device of claim 203, wherein said fastener is of tubular form.*~~
- 218 (Original) *The device of claim 204, including at least one port located in said cylinder assembly for passage of fluid to or from said working chambers, wherein said port is positioned between said pair of components.*
- 219 (Original) *The device of claim 207, wherein said structure is at least partly of insulating material for the purpose of restricting heat transfer from said volume.*
- 220 (Original) *The device of claim 209, wherein said guide is disengagable from said track during operation of said device.*

- 221 (Currently Amended) A device for the working of fluids, said device having an operating cycle and being substantially defined by a casing having an exterior surface, said casing (~~comprising an integral housing~~) at least partly supporting and (~~substantially~~) enclosing a cylinder assembly, said assembly having a cylinder portion and at least one cylinder head portion and a component reciprocally movable within said assembly, said head portion and said component partly defining a cyclically variable working chamber therebetween, said component having an internal passage for transfer of fluids to or from said working chamber, said (chamber) head portion being separated from and pierced by said passage during at least part of said cycle, said casing (housing) including insulating material for the purpose of restricting heat transfer from said assembly, said device having no purposely designed means for transferring heat from said assembly, such means including fluid circulating in a jacket adjacent to said assembly or cooling fins radiating from said assembly.
- 222 (Currently Amended) The device of claim 221, including means to mount said cylinder assembly in said (~~housing~~) casing to enable said cylinder assembly to rotate while said component is reciprocating in said cylinder assembly.
- 223 (Original) The device of claim 221, including means between said cylinder assembly and said component so as to cause said component to rotate relative to said cylinder while reciprocating in said cylinder assembly.
- 224 (Currently Amended) The device of claim 221, wherein at least one of said component and said cylinder assembly is substantially made of ceramic material.
- 225 (Cancelled) ~~The device of claim 221, wherein said component is at least partly composed of ceramic material.~~
- 226 (Currently Amended) The device of claim 221, including at least one fastener, wherein at least one of said component and said cylinder assembly includes a multiplicity of elements held in assembled condition by said at least one fastener loaded under tension.
- 227 (Cancelled) ~~The device of claim 221, including at least one fastener, said reciprocable component comprising a multiplicity of elements, said elements being held in assembled condition by said fastener loaded in tension.~~

- 228 (Original) The device of claim 221, wherein said assembly comprises at least one pair of substantially identical components arranged in mirror image about one another.
- 229 (Original) The device of claim 221, including cylinder assembly surfaces and component surfaces at least partly defining said working chambers, at least one of said surfaces having at least one relatively small deliberately manufactured depression, said depression wholly fillable by fluids worked by said device.
- 230 (Currently Amended) The device of claim 221, including structure located at least in part outside said cylinder assembly and within said exterior surface, said structure at least partly defining at least one volume for passage of fluids to or from (~~at least one of~~) said working chamber (s), said volume being adjacent to and at least partly surrounding portion of said cylinder assembly.
- 231 (Currently Amended) The device of claim 221, wherein said device is (~~part of~~) a reciprocating internal combustion engine and said working chamber is a combustion chamber, said engine having a charge gas supply system, a fuel delivery apparatus and an emission control system for hot exhaust gas emitted from said engine when operative.
- 232 (Original) The device of claim 223, wherein said means comprise a guide and an endless track, said guide movable in said endless track, said track having a multiple wave-form configuration.
- 233 (Original) The device of claim 223, wherein said means comprise said component and said cylinder assembly define complementary surfaces at least partly of an endless wave-like configuration.
- 234 (Original) The device of claim 223, including a rotatable shaft and a load transfer mechanism between said shaft and said rotatable and reciprocable component,, wherein said mechanism comprises a hollow shaft with interior splines slidable on a shaft with external splines.
- 235 (Original) The device of claim 224, including at least one electrical circuit within said ceramic material.

- 236 (Cancelled) ~~The device of claim 225, including at least one electrical circuit within said ceramic material.~~
- 237 (Original) The device of claim 226, wherein said fastener is of tubular form.
- 238 (Cancelled) ~~The device of claim 227, wherein said fastener is of tubular form.~~
- 239 (Original) The device of claim 228, including at least one port located in said cylinder assembly for passage of fluid to or from said working chamber, wherein said port is positioned between said pair of components.
- 240 (Original) The device of claim 230, wherein said structure is at least partly of insulating material for the purpose of restricting heat transfer from said volume.
- 241 (Original) The device of claim 232, wherein said guide is disengagable from said track during operation of said device.
- 242 (Currently Amended) A device for the working of fluids comprising at least one cylinder assembly containing a component reciprocable therein, said component having two longitudinal extremities and at least one circumferential projection, said cylinder assembly having at least one internal circumferential depression in which said projection is positioned to reciprocate, said projection and depression forming a pair of toroidal fluid working chambers of cyclically variable capacity, said component having at least one internal passage for movement of fluids to or from said working chambers, said assembly including a multiplicity of elements of ceramic material held in assembled and abutted condition by at least one fastener loaded in tension, said device having no purposely designed means for transferring heat from said assembly, such means including fluid circulating in a jacket adjacent to said assembly or cooling fins radiating from said assembly.
- 243 (Currently Amended) The device of claim 242, including a (~~housing~~) casing in which said cylinder assembly is mounted.
- 244 (Original) The device of claim 242, including means between said assembly and said component so as to cause said component to rotate relative to said assembly while reciprocating in said assembly.

- 245 (Original) The device of claim 242, including a crankshaft and a connecting rod, to which crankshaft an extremity is linked by said connecting rod.
- 246 (Original) The device of claim 242, wherein at least one of said extremities in normal operation transfers loads associated with said working chambers, said loads in operation being principally in tension.
- 247 (Original) The device of claim 242, wherein said component is at least partly composed of ceramic material.
- 248 (Original) The device of claim 242, wherein said assembly comprises at least one pair of substantially identical components arranged in mirror image about one another.
- 249 (Original) The device of claim 242, including at least one second fastener, said reciprocable component comprising a multiplicity of elements, said elements being held in assembled condition by said second fastener loaded in tension.
- 250 (Original) The device of claim 242, including filamentary material contained in said internal passage.
- 251 (Currently Amended) The device of claim 242, wherein at least one of said cylinder assembly and said component has at least one surface at least partly defining at least one of said working chambers, said surface having at least one relatively small manufactured depression wholly fillable by fluids worked by said device.
- 252 (Cancelled) ~~The device of claim 242, wherein said cylinder assembly has at least one surface at least partly defining said working chamber (s), said surface having at least one relatively small manufactured depressions wholly fillable by fluids worked by said device.~~
- 253 (Original) The device of claim 242, wherein said fastener is of tubular form.
- 254 (Original) The device of claim 242, including at least one electrical circuit within said ceramic material.
- 255 (Currently Amended) The device of claim (242) 244, including a rotatable shaft and a load



*transfer mechanism, said component being linked to said rotatable shaft by said load transfer mechanism.*

- 256 (Currently Amended) *The device of claim 242, including structure located at least in part outside and in proximity to said cylinder assembly, said structure at least partly defining at least one volume for passage of fluids to or from at least one of said working chambers, said volume being adjacent to and at least partly surrounding portion of said cylinder assembly.*
- 257 (Currently Amended) *The device of claim 242, wherein said device is (~~part of~~) a reciprocating internal combustion engine and said working chambers are combustion chambers, said engine having a charge gas supply system, a fuel delivery apparatus and an emission control system for hot exhaust gas emitted from said engine when operative.*
- 258 (Currently Amended) *The device of claim 243, wherein said (~~housing~~) casing is at least partially composed of thermally insulating material.*
- 259 (Currently Amended) *The device of claim 243, including means to mount said cylinder assembly in said (~~housing~~) casing to enable said cylinder assembly to rotate while said component is reciprocating in said cylinder assembly.*
- 260 (Original) *The device of claim 244, wherein said means comprise a guide and an endless track, said guide movable in said endless track, said track having a multiple wave form configuration.*
- 261 (Original) *The device of claim 244, wherein said means comprise said component and said cylinder assembly define complementary surfaces at least partly of endless wave-like configurations.*
- 262 (Original) *The device of claim 247, including at least one electrical circuit within said ceramic material.*
- 263 (Original) *The device of claim 248, wherein said pair of components define a port therebetween for passage of fluid to or from said working chambers.*
- 264 (Original) *The device of claim 249, wherein said second fastener is of tubular form.*

- 265     *(Original)   The device of claim 250, wherein said filamentary material includes substance having catalytic effect to hasten chemical reaction in said working fluid.*
  
- 266     *(Original)   The device of claim 255, wherein said mechanism comprises a hollow shaft with interior splines slidable on a shaft with external splines.*
  
- 267     *(Original)   The device of claim 255, wherein said mechanism comprises a bellows device.*
  
- 268     *(Original)   The device of claim 255, wherein said mechanism includes at least one hinged element.*
  
- 269     *(Original)   The device of claim 255, wherein said mechanism includes at least one pair of substantially parallel flanges separated by at least one roller, the flanges in operation moving laterally relatively to one another.*
  
- 270     *(Original)   The device of claim 256, including filamentary material contained in said volume.*
  
- 271     *(Original)   The device of claim 257, wherein said device is part of a compound engine including said internal combustion engine and a second engine.*
  
- 272     *(Original)   The device of claim 260, wherein said guide is disengagable from said track.*
  
- 273     *(Original)   The device of claim 270, wherein said filamentary material includes substance having catalytic effect to hasten chemical reaction in said working fluid.*
  
- 274     *(Original)   The device of claim 271, wherein said second engine is a turbine engine, in operation said hot exhaust gas being used to power said turbine engine.*
  
- 275     *(Original)   The device of claim 271, wherein said second engine is a steam engine, in operation energy from said hot exhaust gas being used to power said steam engine.*
  
- 276     *(Original)   The device of claim 271, wherein said second engine is a Stirling engine, in operation energy from said hot exhaust gas being used to power said Stirling engine.*

- 277 (Currently Amended) A device for the working of fluids defined by an exterior surface, said device including a (~~comprising an integral~~) structure (-) and a cylinder assembly having at least one internal circumferential depression all substantially located within said surface, (~~and mounted in and at least partly surrounded by said structure and containing a component reciprocable in said assembly,~~) said assembly containing a component having two cylindrical ends each with at least one opening (and), said component having at least one circumferential external projection reciprocable in said (circumferential) depression (in said assembly to form) , in operation said projection and depression forming at least one pair of toroidal fluid working chambers of cyclically variable capacity, said component having at least one internal passage communicating with said openings for transfer of fluids to or from said working chambers, said structure being in proximity to and at least partially surrounding portion of said cylinder assembly and including insulating material to restrict heat transfer from said assembly (-, in operation said openings permitting transfer of fluid between said passage and said working chambers) .
- 278 (Currently Amended) The device of claim 277, including a (~~housing which substantially encloses said structure and said cylinder assembly~~) casing, wherein said exterior surface is substantially that of said casing.
- 279 (Original) The device of claim 277, including means between said assembly and said component so as to cause said component to rotate relative to said assembly while reciprocating in said assembly.
- 280 (Original) The device of claim 277, wherein at least one of said cylinder assembly and said component is at least partly composed of ceramic material.
- 281 (Currently Amended) The device of claim 277, including at least one fastener, wherein at least one of said component and said cylinder assembly includes a multiplicity of elements held in assembled condition by said at least one fastener loaded under tension.
- 282 (Cancelled) ~~The device of claim 277, including at least one fastener, said reciprocable component comprising a multiplicity of elements, said elements being held in assembled condition by said fastener loaded in tension.~~
- 283 (Original) The device of claim 277, wherein said assembly comprises at least one pair of

*substantially identical components arranged in mirror image about one another.*

- 284 (Original) *The device of claim 277, including cylinder assembly surfaces and component surfaces at least partly defining said working chambers, at least one of said surfaces having at least one relatively small deliberately manufactured depression, said depression wholly fillable by fluids worked by said device.*
- 285 (Currently Amended) *The device of claim 277, including at least one volume for passage of fluids to or from at least one of said working chambers, said volume being located substantially between said structure and said cylinder assembly, said volume being adjacent to and at least partly surrounding portion of said cylinder assembly.*
- 286 (Currently Amended) *The device of claim 277, wherein said device is (~~part of~~) a reciprocating internal combustion engine and said working chambers are combustion chambers, said engine having a charge gas supply system, a fuel delivery apparatus and an emission control system for hot exhaust gas emitted from said engine when operative.*
- 287 (Currently Amended) *The device of claim 278, including means to mount said cylinder assembly in said (~~housing~~) casing to enable said cylinder assembly to rotate while said component is reciprocating in said cylinder assembly.*
- 288 (Currently Amended) *The device of claim 278, wherein said (~~housing~~) casing is at least partially composed of thermally insulating material.*
- 289 (Original) *The device of claim 279, wherein said means comprise a guide and an endless track, said guide movable in said endless track, said track having a multiple wave form configuration.*
- 290 (Original) *The device of claim 279, wherein said means comprise said component and said cylinder assembly define complementary surfaces at least partly of endless wave-like configurations.*
- 291 (Original) *The device of claim 279, including a rotatable shaft and a load transfer mechanism between said shaft and said rotatable and reciprocable component, wherein said mechanism comprises a hollow shaft with interior splines slidable on a shaft with*

*external splines.*

292 (Original) *The device of claim 280, including at least one electrical circuit within said ceramic material.*

293 (Original) *The device of claim 281, wherein said fastener is of tubular form.*

294 (Cancelled) ~~*The device of claim 282, wherein said fastener is of tubular form.*~~

295 (Original) *The device of claim 283, including at least one port located in said cylinder assembly for passage of fluid to or from said working chambers, wherein said port is positioned between said pair of components.*

296 (Original) *The device of claim 289, wherein said guide is disengagable from said track during operation of said device.*

297 (Original) *A device for the working of fluids, said device having a cylinder assembly comprising a cylinder with at least one internal circumferential depression, said assembly containing a component with at least one external circumferential projection, said external circumferential projection reciprocating in said circumferential depression and both having working surfaces defining at least one pair of toroidal fluid working chambers which in operation have cyclically variable capacity, said assembly including a multiplicity of elements of ceramic material held in assembled and abutted condition by at least one fastener loaded in tension.*

298 (Currently Amended) *The device of claim 297, including a ~~(housing)~~ casing, wherein said ~~(housing)~~ casing at least partly encloses said cylinder assembly.*

299 (Currently Amended) *The device of claim 297, including means between said assembly and said component so as to cause said component to rotate relative to said assembly while reciprocating in said assembly, wherein said device is an internal combustion engine and at least one of said fluid working chambers functions as a combustion chamber, said engine having no purposely designed means for transferring heat from said combustion chamber, such means including fluid circulating in a jacket adjacent to said assembly or cooling fins radiating from said assembly.*

- 300 (Original) The device of claim 297, wherein said component is at least partly composed of ceramic material.
- 301 (Original) The device of claim 297, including at least one second fastener, said reciprocable component comprising a multiplicity of elements, said elements being held in assembled condition by said fastener loaded in tension.
- 302 (Original) The device of claim 297, wherein said assembly comprises at least one pair of substantially identical components arranged in mirror image about one another.
- 303 (Original) The device of claim 297, wherein said component defines a passage for fluids worked by said device.
- 304 (Original) The device of claim 297, including cylinder assembly surfaces and component surfaces at least partly defining said working chambers, at least one of said surfaces having at least one relatively small manufactured depression, said depression wholly fillable by fluids worked by said device.
- 305 (Original) The device of claim 297, wherein said fastener is of tubular form.
- 306 (Original) The device of claim 297, including at least one electrical circuit within said ceramic material.
- 307 (Currently Amended) The device of claim 297, including structure located at least in part outside said cylinder assembly, said structure at least partly defining at least one volume for passage of fluids to or from at least one of said working chambers, said volume being adjacent to and at least partly surrounding portion of said cylinder assembly.
- 308 (Currently Amended) The device of claim 297, wherein said device is (~~part of~~) a reciprocating internal combustion engine and said working chambers are combustion chambers, said engine having a charge gas supply system, a fuel delivery apparatus and an emission control system for hot exhaust gas emitted from said engine when operative.
- 309 (Currently Amended) The device of claim 298, including means to mount said cylinder assembly in said (~~housing~~) casing to enable said cylinder assembly to rotate while said

*component is reciprocating in said cylinder assembly.*

310 (Currently Amended) *The device of claim 298, wherein said (~~housing~~) casing is at least partially composed of thermally insulating material.*

311 (Original) *The device of claim 299, wherein said means comprise a guide and an endless track, said guide movable in said endless track, said track having a multiple wave-form configuration.*

312 (Original) *The device of claim 299, wherein said means comprise said component and said cylinder assembly define complementary surfaces at least partly of an endless wave-like configuration.*

313 (Original) *The device of claim 299, including a rotatable shaft and a load transfer mechanism between said shaft and said rotatable and reciprocable component, wherein said mechanism comprises a hollow shaft with interior splines slidable on a shaft with external splines.*

314 (Original) *The device of claim 299, including a rotatable shaft and a load transfer mechanism between said shaft and said component, wherein said mechanism includes a bellows device.*

315 (Original) *The device of claim 299, including a rotatable shaft and a load transfer mechanism between said shaft and said component, wherein said mechanism includes at least one hinged element.*

316 (Original) *The device of claim 299, including a rotatable shaft and a load transfer mechanism between said shaft and said component, wherein said mechanism includes at least one pair of substantially parallel flanges separated by at least one roller, the flanges in operation moving laterally relatively to one another.*

317 (Original) *The device of claim 300, including at least one electrical circuit within said ceramic material.*

318 (Original) *The device of claim 301, wherein said second fastener is of tubular form.*

- 319 (Original) The device of claim 302, including at least one port located in said cylinder assembly for passage of fluid to or from said working chambers, wherein said port is positioned between said pair of components.
- 320 (Original) The device of claim 310, wherein said guide is disengagable from said track.
- 321 (Currently Amended) A device for the working of fluids defined by an exterior surface, said device including substantially within said surface (comprising) a structure, a cylinder assembly, a component reciprocable within said assembly (,) and filamentary material, said component having at least one external circumferential projection, said cylinder assembly having at least one internal circumferential depression in which said projection is positioned to reciprocate, in operation said projection and depression defining a pair of toroidal fluid working chambers of cyclically variable capacity, said structure located outside said cylinder assembly and within said exterior surface, said structure together with said assembly at least partly defining a volume for passage of fluids to or from said working chambers, said volume containing said filamentary material and at least partly surrounding portion of said cylinder assembly.
- 322 (Currently Amended) The device of claim 321, including a ~~(housing)~~ casing, wherein said ~~(housing substantially encloses said structure and said cylinder assembly)~~ wherein said exterior surface is substantially that of said casing.
- 323 (Original) The device of claim 321, including means between said assembly and said component so as to cause said component to rotate relative to said assembly while reciprocating in said assembly.
- 324 (Original) The device of claim 321, wherein at least one of said cylinder assembly and said component is at least partly composed of ceramic material.
- 325 (Currently Amended) The device of claim 321, including at least one fastener, wherein at least one of said component and said cylinder assembly includes a multiplicity of elements held in assembled condition by said at least one fastener loaded under tension.
- 326 (Cancelled) ~~The device of claim 321, including at least one fastener, said reciprocable~~



~~component comprising a multiplicity of elements, said elements being held in assembled condition by said fastener loaded in tension.~~

- 327 (Original) The device of claim 321, wherein said assembly comprises at least one pair of substantially identical components arranged in mirror image about one another.
- 328 (Original) The device of claim 321, wherein said component defines a passage for fluids worked by said device.
- 329 (Original) The device of claim 321, including cylinder assembly surfaces and component surfaces at least partly defining said working chambers, at least one of said surfaces having at least one relatively small deliberately manufactured depression, said depression wholly fillable by fluids worked by said device.
- 330 (Original) The device of claim 321, wherein said filamentary material includes substance having catalytic effect to hasten chemical reaction in said working fluid.
- 331 (Original) The device of claim 321, wherein said structure is at least partly composed of thermally insulating material.
- 332 (Currently Amended) The device of claim 321, wherein said device is (~~part of~~) a reciprocating internal combustion engine and said working chambers are combustion chambers, said engine having a charge gas supply system, a fuel delivery apparatus and an emission control system for hot exhaust gas emitted from said engine when operative.
- 333 (Currently Amended) The device of claim 322, including means to mount said cylinder assembly in said (~~housing~~) casing to enable said cylinder assembly to rotate while said component is reciprocating in said cylinder assembly.
- 334 (Currently Amended) The device of claim 322, wherein said (~~housing~~) casing is at least partly of thermally insulating material.
- 335 (Original) The device of claim 323, wherein said means comprise a guide and an endless track, said guide movable in said endless track, said track having a multiple wave form configuration.

- 336 (Original) The device of claim 323, wherein said means comprise said component and said cylinder assembly define complementary surfaces at least partly of endless wave-like configuration.
- 337 (Original) The device of claim 323, including a rotatable shaft and a load transfer mechanism between said shaft and said rotatable and reciprocable component, wherein said mechanism comprises a hollow shaft with interior splines slidable on a shaft with external splines.
- 338 (Original) The device of claim 324, including at least one electrical circuit within said ceramic material.
- 339 (Original) The device of claim 325, wherein said fastener is of tubular form.
- 340 (Cancelled) ~~The device of claim 326, wherein said fastener is of tubular form.~~
- 341 (Original) The device of claim 327, including at least one port located in said cylinder assembly for passage of fluid to or from said working chambers, wherein said port is positioned between said pair of components.
- 342 (Original) The device of claim 328, including filamentary material contained in said passage, wherein said filamentary material includes substance having catalytic effect to hasten chemical reaction in said working fluid.
- 343 (Original) The device of claim 335, wherein said guide is disengagable from said track during operation of said device.
- 344 (Currently Amended) The device of any of claims 198, 208, 221, 231, (242,) 257, 277, 286, 297, 308, 321, 332 or 349, including a crankshaft and a connecting ~~(rod or link, to which crankshaft)~~ element for transfer of loads associated with said working chambers, said element mechanically linking said component to said crankshaft (is mechanically linked at least in part by said connecting rod).
- 345 (Currently Amended) The device of any of claims ~~(198, 208, 221, 231, 242, 257, 277, 286, 297, 308, 321, 332, 349 or 350)~~ 344, wherein (said device including at least one crankshaft,

~~to which said component is connected by at least one mechanical linkage~~) in normal operation said loads are substantially (loaded in tension) tensile, said (linkage) element transferring said loads (associated with said working chambers) to or from said crankshaft primarily by a pulling action rather than a pushing action.

346 (Currently Amended) The device of any of claims 208, 231, ~~(242, 257,)~~ 286, 297, ~~(308),~~ 332 or 349, including a first space for transfer of fluid to at least one said working chamber, at least one additional space for transfer of fluid from said working chamber, wherein at least one of said spaces contains filamentary material, said filamentary material including at least some substance having catalytic effect to hasten chemical reaction in said fluid.

347 (Currently Amended) The device of any of claims 198, 200, 201, ~~(221, 242,)~~ 277, 279, ~~(280,)~~ 297, 309, 321, or 323 ~~(or 324)~~, wherein said device is ~~(part of)~~ an internal combustion engine and at least one said fluid working chamber functions as a combustion chamber, said engine having a charge gas supply system, a fuel delivery apparatus and an emission control system for hot exhaust gas emitted from said engine when operative, said engine having no purposely designed means for transferring heat from said combustion chamber (and being capable of continuous operation for an indefinite period), such means including fluid circulating in a jacket adjacent to said assembly or cooling fins radiating from said assembly.

348 (Currently Amended) The device of any of claims 347, wherein said device is part of a compound engine including ~~(the engine of claim 347 and)~~ a turbine engine stage, in operation said hot exhaust gas being used to at least partly power said turbine engine stage.

349 (Currently Amended) A device for processing fluids ~~(having)~~ said device substantially defined by a casing having an exterior surface and thermal insulation, said casing at least partly supporting and enclosing at least one cylinder assembly including a cylinder and at least one (partly closed end functioning as a) cylinder head, said assembly containing a component reciprocable therein (in said cylinder) to define at least one working chamber of cyclically varying capacity located between said component said cylinder and said cylinder head, wherein said device is an un-cooled reciprocating internal combustion engine and said working chamber functions as a combustion chamber, said engine having a charge gas supply system, a fuel delivery apparatus and an emission control system for hot exhaust gas emitted from said engine when operative, said engine (being free of purposely designed mechanism or construction for transferring heat from said cylinder or said cylinder head and being capable

~~of continuous operation for an indefinite period) having no purposely designed means for transferring heat from said assembly nor any circulating liquid lubrication between said component and said cylinder.~~

350 (Original) The device of claim 349, wherein at least one of said cylinder, said cylinder head and said component is substantially of ceramic material.

351 (Original) The device of claim 350, including at least one electrical circuit within said ceramic material.

352 (Cancelled) ~~The device of claim 349, including a housing in which said cylinder assembly is mounted, said housing being at least partially composed of thermally insulating material.~~

353 (Currently Amended) The device of claim 349, including at least one fastener, wherein at least one of said component and said cylinder assembly includes a multiplicity of elements held in assembled condition by said fastener loaded under tension.

354 (Cancelled) ~~The device of claim 349, including at least one fastener, wherein said component includes a multiplicity of elements held in assembled condition by said fastener loaded under tension.~~

355 (Original) The device of claim 349, including cylinder assembly surfaces and component surfaces at least partly defining said working chambers, at least one of said surfaces having at least one relatively small deliberately manufactured depression, said depression wholly fillable by fluids worked by said device.

356 (Currently Amended) The device of claim 349, including structure located substantially within said surface and (at least in part) outside and proximate to said cylinder assembly, said structure at least partly defining at least one volume for passage of fluids to or from said working chamber, said volume being adjacent to and at least partly surrounding portion of said cylinder assembly.

357 (Currently Amended) The device of claim 349, wherein said device is part of a compound engine including ~~(the engine of claim 349 and)~~ a turbine engine stage, in operation said hot exhaust gas being used to at least partly power said turbine engine stage.

358 (Original) The device of claim 208, wherein said fuel delivery apparatus includes at least one injector assembly for delivery of at least two distinct fluids independently of one another.

359 (Original) The device of claim 231, wherein said fuel delivery apparatus includes at least one injector assembly for delivery of at least two distinct fluids independently of one another.

360 (Original) The device of claim 257, wherein said fuel delivery apparatus includes at least one injector assembly for delivery of at least two distinct fluids independently of one another.

361 (Original) The device of claim 286, wherein said fuel delivery apparatus includes at least one injector assembly for delivery of at least two distinct fluids independently of one another.

362 (Original) The device of claim 308, wherein said fuel delivery apparatus includes at least one injector assembly for delivery of at least two distinct fluids independently of one another.

363 (Original) The device of claim 332, wherein said fuel delivery apparatus includes at least one injector assembly for delivery of at least two distinct fluids independently of one another.

364 (Original) The device of claim 349, wherein said fuel delivery apparatus includes at least one injector assembly for delivery of at least two distinct fluids independently of one another.

365 (Cancelled) ~~The device of claim 350, wherein said fuel delivery apparatus includes at least one injector assembly for delivery of at least two distinct fluids independently of one another.~~

366 (Cancelled) ~~The device of claim 351, wherein said fuel delivery apparatus includes at least one injector assembly for delivery of at least two distinct fluids independently of one another.~~

367 (Currently amended) The device of (any of) claim(s) 208, wherein said emission control system includes at least one valve for restricting flow of said exhaust gas during selected operating periods of said reciprocating internal combustion engine.

368 (Currently amended) The device of (any of) claim(s) 231, wherein said emission control system includes at least one valve for restricting flow of said exhaust gas during selected operating periods of said reciprocating internal combustion engine.

- 369 (Currently Amended) The device of (~~any of~~) claim(s) 257, wherein said emission control system includes at least one valve for restricting flow of said exhaust gas during selected operating periods of said reciprocating internal combustion engine.
- 370 (Cancelled) ~~The device of (~~any of~~) claim(s) 274, wherein said emission control system includes at least one valve for restricting flow of said exhaust gas during selected operating periods of said reciprocating internal combustion engine.~~
- 371 (Currently amended) The device of (~~any of~~) claim(s) 286, wherein said emission control system includes at least one valve for restricting flow of said exhaust gas during selected operating periods of said reciprocating internal combustion engine.
- 372 (Currently amended) The device of (~~any of~~) claim(s) 308, wherein said emission control system includes at least one valve for restricting flow of said exhaust gas during selected operating periods of said reciprocating internal combustion engine.
- 373 (Cancelled) ~~The device of claims 308, wherein said emission control system includes at least one valve for restricting flow of said exhaust gas during selected operating periods of said reciprocating internal combustion engine.~~
- 374 (Currently amended) The device of (~~any of~~) claim(s) 332, wherein said emission control system includes at least one valve for restricting flow of said exhaust gas during selected operating periods of said reciprocating internal combustion engine.
- 375 (Currently amended) The device of (~~any of~~) claim(s) 349, wherein said emission control system includes at least one valve for restricting flow of said exhaust gas during selected operating periods of said reciprocating internal combustion engine.
- 376 (Cancelled) ~~The device of claim 357, wherein said emission control system includes at least one valve for restricting flow of said exhaust gas during selected operating periods of said reciprocating internal combustion engine.~~
- 377 (New Claim) The device of claim 208, wherein said engine has no purposely designed means for transferring heat from said combustion chamber, such means including fluid circulating in a jacket adjacent to said assembly or cooling fins radiating from said assembly.

- 378 (New Claim) *The device of claim 286, wherein said engine has no purposely designed means for transferring heat from said combustion chamber, such means including fluid circulating in a jacket adjacent to said assembly or cooling fins radiating from said assembly.*
- 379 (New Claim) *The device of claim 308, wherein said engine has no purposely designed means for transferring heat from said combustion chamber, such means including fluid circulating in a jacket adjacent to said assembly or cooling fins radiating from said assembly.*
- 380 (New Claim) *The device of claim 332, wherein said engine has no purposely designed means for transferring heat from said combustion chamber, such means including fluid circulating in a jacket adjacent to said assembly or cooling fins radiating from said assembly.*
- 381 (New Claim) *The device of claim 349, wherein said assembly comprises at least one pair of substantially identical components arranged in mirror image about one another.*
- 382 (New Claim) *The device of claim 349, wherein said component defines a passage for fluids worked by said device.*
- 383 (New Claim) *The device of claim 349, including means to mount said cylinder assembly in said casing to enable said cylinder assembly to rotate while said component is reciprocating in said cylinder assembly.*
- 384 (New Claim) *The device of claim 349, said cylinder assembly having two heads and said cylinder at least one internal circumferential depression, said component having at least one external circumferential projection, said projection reciprocatable in said depression to form two said chambers of toroidal configuration.*
- 385 (New Claim) *The device of claim 349, including means between said assembly and said component so as to cause said component to rotate relative to said assembly while reciprocating in said assembly.*
- 386 (New Claim) *The device of claim 385, wherein said means comprise a guide and an endless track, said guide movable in said endless track, said track having a multiple wave-form configuration.*

- 387 (New Claim) *The device of claim 385, wherein said means comprise said component and said cylinder assembly defining complementary surfaces at least partly of an endless wave-like configuration.*
- 388 (New Claim) *The device of claim 385, including a rotatable shaft and a load transfer mechanism between said shaft and said rotatable and reciprocable component, wherein said mechanism comprises a hollow shaft with interior splines slidable on a shaft with external splines.*
- 389 (New Claim) *The device of claim 385, including a rotatable shaft and a load transfer mechanism between said shaft and said component, wherein said mechanism includes a bellows device.*
- 390 (New Claim) *The device of claim 385, including a rotatable shaft and a load transfer mechanism between said shaft and said component, wherein said mechanism includes at least one hinged element.*
- 391 (New Claim) *The device of claim 385, including a rotatable shaft and a load transfer mechanism between said shaft and said component, wherein said mechanism includes at least one pair of substantially parallel flanges separated by at least one roller, the flanges in operation moving laterally relatively to one another.*
- 392 (New Claim) *The device of claim 349, wherein said device is part of a compound engine including a steam engine stage, in operation said hot exhaust gas being used to at least partly power said steam engine stage.*
- 393 (New Claim) *The device of claim 349, wherein said device is part of a compound engine including a Stirling engine stage, in operation said hot exhaust gas being used to at least partly power said Stirling engine stage.*
- 394 (New Claim) *The device of claim 223, including a rotatable shaft and a load transfer mechanism between said shaft and said component, wherein said mechanism includes at least one pair of substantially parallel flanges separated by at least one roller, the flanges in operation moving laterally relatively to one another.*



- 395 (New Claim) *The device of claim 279, including a rotatable shaft and a load transfer mechanism between said shaft and said component, wherein said mechanism includes at least one pair of substantially parallel flanges separated by at least one roller, the flanges in operation moving laterally relatively to one another.*
- 396 (New Claim) *The device of claim 323, including a rotatable shaft and a load transfer mechanism between said shaft and said component, wherein said mechanism includes at least one pair of substantially parallel flanges separated by at least one roller, the flanges in operation moving laterally relatively to one another.*

*END OF CLAIMS*